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Management of On-site and Small Community Wastewater Systems

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West Chester, PA

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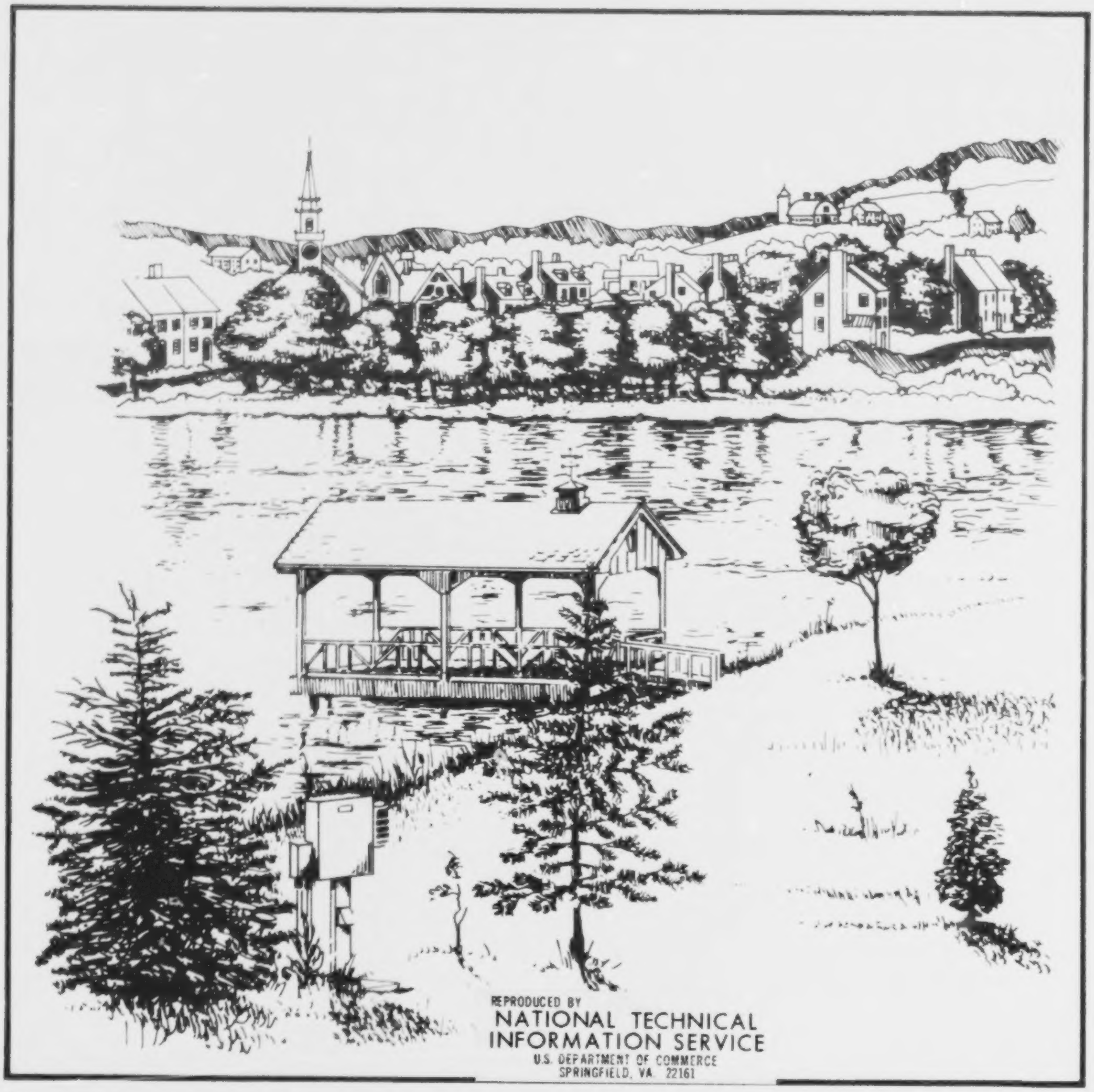

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16. ABSTRACT

The document represents a relatively simple, yet comprehensive guide to small communities and their engineers to develop an effective and, hopefully, optimal management program for alternative technologies which are appropriate to solving their wastewater pollution problems. Although it is prepared to respond to the requirements of the U.S. EPA Construction Grants Program, the text is applicable to all existing small communities wishing to optimize the performance of existing or planned on-site or small community wastewater treatment and disposal systems. By presenting optimum management program selection in a simple step-by-step fashion, this guide permits the user to design the appropriate program based on technical processes and physical, economic and administrative constraints extant in the service area.

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SMALL COMMUNITY WASTEWATER SYSTEMS

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FOREWORD

The U.S. Environmental Protection Agency was created because of increasing public and government concern about the dangers of pollution to the health and welfare of the American people. Noxious air, foul water, and spoiled land are tragic testimony to the deterioration of our natural environment. The complexity of that environment and the interplay between its components require a concentrated and integrated attack on the problem.

Research and development is that necessary first step in problem solution, and it involves defining the problem, measuring its impact, and searching for solutions. The Municipal Environmental Research Laboratory develops new and improved technology and systems for the prevention, treatment, and management of wastewater and solid and hazardous waste pollutant discharges from municipal and community sources, for the preservation and treatment of public drinking water supplies, and to minimize the adverse economic, social, health, and aesthetic effects of pollution. This publication is one of the products of that research; a most vital communications link between the researcher and the user community.

There is an increasing awareness for the need to properly manage small wastewater system design, installation, and operation to assure adequate long-term system performance. The Clean Water Act of 1977 (PL 95-217) recognized that on-site and small community wastewater systems, which are properly designed, installed, and maintained (i.e., managed) could be the most cost-effective and environmentally-acceptable wastewater approach for small communities and urban fringe areas. While Federal and state agencies are promoting the use of small wastewater systems where they are cost-effective, several significant institutional, attitudinal, and technological barriers inhibit their widespread application.

Providing guidance for developing the institutional framework for a comprehensive, well-structured management program is a major objective of this document.

Francis T. Mayo
Director, Municipal Environmental
Research Laboratory

ABSTRACT

The document represents a relatively simple, yet comprehensive guide to small communities and their engineers to develop an effective and, hopefully, optimal management program for alternative technologies which are appropriate to solving their wastewater pollution problems. Although it is prepared to respond to the requirements of the U.S. EPA Construction Grants Program, the text is applicable to all existing small communities wishing to optimize the performance of existing or planned on-site or small community wastewater treatment and disposal systems. By presenting optimum management program selection in a simple step-by-step fashion, this guide permits the user to design the appropriate program based on technical processes and physical, economic and administrative constraints extant in the service area.

This report was submitted in fulfillment of Contract No. 68-03-2753 by Roy Weston, Inc., under the sponsorship of the U.S. Environmental Protection Agency. This report covers the period December 1978 to July 1981, and work was completed as of November 1981.

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DEFINITIONS

Brief definitions of the common terms and phrases utilized in this report are provided below:

1. Small Wastewater Systems/Small Flows System -- Small wastewater systems include a broad range of technologies that provide for the collection, treatment, and/or disposal of wastewater, including on-site, individual, alternative, cluster, and small community systems.

2. Management -- The act or process of controlling, directing, and handling a resource, facility, or a group of people. The management of small wastewater systems includes any actions taken to ensure the proper design, installation, and operation of these systems.

3. Management Program -- In the context of this report, the organized provision of services related to the collection, treatment, and disposal of wastewater. A management program is developed after a number of technology and management options have been evaluated.

4. Management Plan -- A strategy for implementing a management program emphasizing the geographical, cultural, governmental, and physical setting of the study area, as well as technology requirements. A wastewater management plan has both technical (or engineering) and institutional components.

5. Management Functions -- Basic elements of a wastewater management plan. They essentially represent a range of services and responsibilities related to the implementation of technical methods of treating and disposing of wastewater.

6. Management Agency -- The lead or principal institutional entity which is designated to carry out key management functions. The management agency is essentially the formal administrative entity which will make decisions, handle financial matters, and supervise operation and maintenance activities.

7. Institutions -- Organizations such as general purpose governmental, or nongovernmental entities, and private interests involved in wastewater management.

8. Institutional Arrangements -- Combinations of existing or new governmental, or nongovernmental utilities required to implement wastewater management functions.

ACKNOWLEDGEMENTS

This project was sponsored by the U.S. Environmental Protection Agency's Small Flows Research Program of the Municipal Environmental Research Laboratory (MERL) located in Cincinnati, Ohio. Mr. Don Niehus (formerly with the Small Flows Program and currently with the Facilities Requirements Division, Office of Water Program Operations in Washington, DC) originally served as Project Officer. Mr. James Kreissl, the Small Flows Research Program Manager, has been a special project advisor from the beginning of the study. Both Mr. Niehus and Mr. Kreissl have provided valuable assistance and guidance in the preparation of this report.

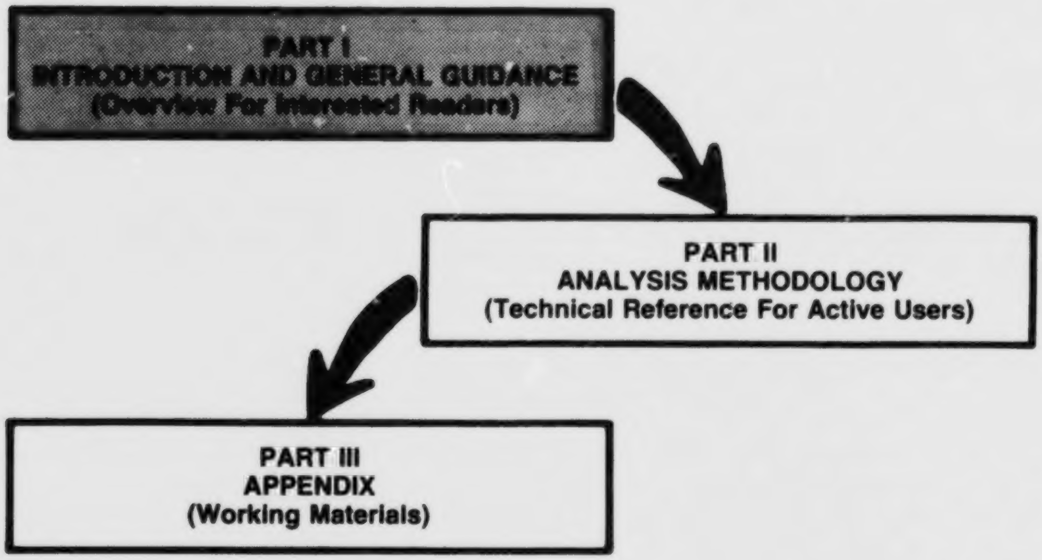
Much of the information in this publication is based on actual field experience in small wastewater systems management. The numerous people interviewed during the case study phase of this project deserve special thanks for their time, interest, and knowledge. Their help and advice is appreciated. We hope that the information presented meets their expectations, and more importantly, assists in the implementation of small wastewater systems management programs.

This document was prepared by Mr. Peter A. Ciotoli, AICP, principal investigator on this project. Mr. Kenneth C. Wiswall, P.E., was a major contributor to the preparation of this report, offering ideas, comments, and guidance along the way. Mr. Glenn M. Johnson, P.E. was the Project Manager, and the late Dr. Andrew Breidenbach was the Project Director. The following people also provided technical advice on preparation of the document: Dr. Thomas J. Tuffey (now Project Director), Mr. Van Dyke Polhemus, Mr. Thomas Cadwallader, P.E., and Dr. Richard S. Greeley. Ms. Pat Saia was the principal report editor. Mr. Robert Dzedzy, Ms. Teresa Wischerath, and Mr. Dale Thompson prepared the report graphics. Mr. Irv Taylor, Ms. Gail Wilmer, and Ms. Mary Anne Miller provided the word processing services for the document.

PART I: INTRODUCTION AND GENERAL GUIDANCE

Chapter 1: Introduction and Background
Chapter 2: Management Program Development Process

This part of the report gives an overview of the basic elements of the management program formulation process and offers some general observations and recommendations to persons interested in forming management programs. An example is utilized to illustrate the steps and decisions normally made in developing a management program.


PART I
INTRODUCTION AND GENERAL GUIDANCE
(Overview For Interested Readers)
PART II
ANALYSIS METHODOLOGY
(Technical Reference For Active Users)
PART III
APPENDIX
(Working Materials)

OTHER SOURCES OF INFORMATION

It is not expected that this document alone will provide all the information which might be required to understand the institutional elements of small wastewater systems management. Other sources of information are available and should be reviewed in conjunction with this report in addressing these issues, within the broader context of wastewater management. Sources of information that supplement and complement the material presented herein are referenced in a recently prepared EPA strategy paper, "A Strategy for Small Alternative Wastewater Systems." Copies can be obtained from:

Office of Water Program Operations (WH-595)
U.S. Environmental Protection Agency
Washington, DC 20460

Another source of information on the technical literature and EPA publications, as well as data on actual projects being implemented under the Construction Grants Program is:

EPA Small Wastewater Flows Clearinghouse
West Virginia University
Morgantown, West Virginia 26506
(800) 624-8301

The Clearinghouse was established by Congress as part of the 1977 Amendments to the Clean Water Act, and is funded and directed by EPA.

CHAPTER 1

INTRODUCTION AND BACKGROUND

There has been a growing interest in the concept of small wastewater systems management over recent years. Due to the increasing costs of constructing and maintaining conventional sewerage systems, the use of the nonconventional forms of wastewater management is being promoted, particularly in small communities and rural areas.

In recognition of the growing interest in small wastewater systems, the EPA and other Federal and state agencies have devoted much attention to developing and refining the state-of-the-art in small systems technology. Considerable research effort has been devoted to the study of performance characteristics and design criteria for various types of small wastewater systems and for septage handling technologies. The scope of these Federal and state research efforts has been expanded to address the institutional and regulatory issues involved in applying alternative wastewater technologies.

PURPOSE OF THE REPORT

This report is devoted to investigation of the institutional aspects of small wastewater systems management. Its underlying theme is that through proper management, small wastewater systems can provide cost-effective, permanent methods of wastewater disposal in rural and developing areas. Institutions at the Federal, state, and local level play a critical role in the management of these systems. Federal and state agencies provide a wide variety of small systems regulatory and management activities, including technical and financial assistance, policy setting, promulgation of rules, regulations and legislation, and code enforcement. The direct responsibility for regulating and managing small wastewater systems has traditionally been delegated to local government units (e.g., counties, municipalities, and special purpose agencies), property owners, and the private sector (e.g., septic system installers, septage haulers, and developers).

Given this complex institutional framework and the multitude of agencies at different levels of government involved, the topic of institutional analysis is one that deserves special attention by planners, engineers, and others involved in developing small flows wastewater programs. This report explains the legal, financial, administrative, and regulatory capabilities of these institutions, as well as describes their typical and potential involvement in managing small wastewater systems. The intent of the report is to assist participants in the EPA 201 Construction Grants Program and related Federal, state, and local water quality wastewater and land use management programs in developing effective institutional arrangements to manage small wastewater systems.

This report provides information and guidance to persons interested in developing and evaluating programs to manage small wastewater systems. These management programs involve the application of various types of institutional arrangements which specify who will design, build, operate, maintain, and finance these small wastewater systems.

BACKGROUND

The impetus for this study resulted from a series of Federal statutes and policies addressing small flow systems, and the related need to develop and refine the available information base concerning the synthesis of institutional arrangements for small wastewater systems management. Much of the information presented in this document is a result of a series of case studies prepared during the first phase of the study. The background discussion presents highlights of the appropriate Federal guidance and case studies.

The subject of institutional arrangements for managing small wastewater systems is now recognized as a critical component in the process of formulating and implementing a wastewater management plan for a community.

Until recently, conventional centralized sewerage facilities were generally considered to be the most reliable and most logical means of dealing with a community's wastewater services needs. As centralized facilities were constructed and operated over the years, it became apparent that large projects or traditional designs might not be the most cost-effective solution in some cases. For many small rural and suburban communities, the necessary capital and operating costs for conventional systems can create undue financial burdens on individual homeowners, as well as the community at large.

This problem was recognized to some degree in the 1972 amendments to the Federal Water Pollution Control Act (PL 92-500) which charged the EPA Administrator with investigating appropriate rural wastewater management alternatives. Subsequent areawide water quality management planning efforts (specified in Section 208 of PL 92-500) clearly identified the need for better managed individual on-site wastewater systems and lower cost small community systems. Certain 208 studies specifically proposed on-site and small community systems as alternatives, to centralized treatment facilities. EPA had already expanded its studies of various aspects of on-site and small community treatment technology to define the state-of-the-art for different technologies related to this field.

The impact of conventional sewerage project costs on small communities was first officially recognized by the EPA Construction Grants Program in 1976 through a Program Requirements Memorandum (PRM 76-3) which called for disclosure of individual user costs. This issue was also addressed in several EPA memoranda dealing with the grant eligibility of individual systems, and the encouragement of less costly treatment systems for small communities.

Individual and alternative systems were given further attention by certain provisions of PL 95-217, the 1977 Clean Water Act. Incentives for considering such systems were provided primarily through funding individual systems, and the allocation of state-level "set-aside" funds for innovative and alternative wastewater system construction grants for small communities. PRM 79-8 provided further clarification of PL 95-217 and the EPA Construction Grants Program regulations pertaining to small wastewater systems.

Given these incentives, many states are actively encouraging the application of alternative wastewater management systems. A number of states had established programs dealing with individual and/or small community systems prior to the Federal program incentive actions. However, even with these ongoing state programs, Federal incentives, and the currently changing attitude toward alternative systems, the actual implementation of alternative wastewater management systems is occurring only gradually.

Recent Federal guidance on small wastewater system management issues is presented in two EPA strategy papers:

1. "1990 Preliminary Draft Strategy for Municipal Wastewater Treatment," Office of Water and Waste Management, Washington, D.C., January 1981.

2. "A Strategy for Small Alternative Wastewater Systems," Office of Water Program Operations, Washington, D.C., December 1980.

The objective of the 1990 strategy is to develop a management and funding approach to the Construction Grants Program in the 1980's, that would achieve state self-sufficiency in funding and overall management capability, and maintain the national perspective of the program among the states. This strategy is based on the premise that small communities need guidance and assistance from EPA and state agencies in wastewater facilities planning, funding, and related management activities.

The Small Alternative Wastewater Systems (SAWS) Strategy develops a comprehensive planning and management approach to promote the implementation and improve the performance of small flows systems.

Available Federal guidance and past experience in many communities demonstrate the need to carefully design the process for wastewater management planning to account for the special qualities, characteristics and sensitivities of the local residents and agencies; i.e., institutional concerns.

Much of the information presented in this report is a result of 18 case studies; nine community case studies and nine state case studies, conducted by the authors.[1] Many of the management experiences and planning approaches applied in these case studies have been incorporated into this report.

The case studies included field visits to a range of state and local management programs that were funded by the EPA Construction Grants Program, as well as those that were funded locally, or by state or Federal agencies. The insights gained through these case studies, and supplemental literature reviews point out the necessity of clearly defining institutional and organizational responsibilities in order to achieve successful and viable wastewater management programs. A successful management program is characterized by a combination of technical, institutional, and financial elements.

Key factors to success in formulating small community wastewater management programs include:

1. **Public acceptance and local political support.**
2. **Funding availability -- reasonable costs.**
3. **Visibility and accountability of local leaders.**
4. **Capability and skills of technical/field staff.**
5. **Availability of creative, professional advisors.**
6. **Clear and concise legal authority, regulations, and enforcement mechanisms.**

Satisfying these key ingredients in a successful management program can be a difficult and involved process. Many small communities are unincorporated and have unpaid and part-time officials, who may not have strong technical knowledge in wastewater management, nor adequate understanding and experience in dealing with other levels of government. These factors and others discussed in this report influence how the planning process must be approached.

---

[1] For state and local case study summaries, refer to the Interim Study Report, Management of On-Site and Small Community Wastewater Systems, U.S. EPA Municipal Environmental Research Laboratory, M687, by Roy F. Weston, Inc., November 1979.

MANAGEMENT PROGRAM DEVELOPMENT

A program to manage small wastewater systems may be developed for many reasons. The program may be developed in response to a specific water pollution condition, or prepared to avoid such problems in the future. In either case, the community must decide what wastewater services must be provided. It must then develop a program that provides the institutional structure with which to carry out these essential services. The institutional structure (an arrangement of public and private organizations) will constitute the mechanism for setting and enforcing regulations, performing system inspections and maintenance, and monitoring program performance.

Wastewater management services are provided through a program — a mix of institutions and procedures, developed through a series of major phases, i.e., initiation, planning, implementation, and facility start-up.

To develop a workable management program, it is essential that rural wastewater facilities be simple in design, operation, and maintenance, and that the management system also be simple. Furthermore, the management system must:

1. Have sufficient local support and legal authority.
2. Be flexible enough to adapt to changing demands.
3. Have a reasonable homeowner cost structure.
4. Be effective in achieving the desired objectives.

Developing a management program to serve the requirements described may not be a simple task. The program development process can be described as four distinct phases of program analysis and change. These phases represent different stages of planning and implementation that apply in general to any management program. They are illustrated on Figure 1, and described as follows:

1. Initiation Phase -- Actions and activities leading to the preparation of a "Plan of Study" which documents the wastewater management needs of a community and presents a general methodology for developing technical and management solutions. Specific activities include:

   a. Organizing a program development team.

   b. Developing program goals and objectives.

   c. Preliminary assessment of need; plan of study.

   d. Initiating public participation activities.

   e. Acquisition of planning funds.

2. Planning Phase -- Detailed study of alternative wastewater systems and institutional arrangements (including legal, financial, and organizational requirements), and development of recommended management plan. This phase is synonymous with Step 1 of the 201 facilities planning process, whereby a recommended wastewater management plan is prepared, and more importantly, an institutional framework is established where changes to the management system can evolve to meet changing requirements as the wastewater system is being designed, built, and ultimately put into operation. The following are typical planning phase activities:

   a. Assessment of existing wastewater system performance, physical area constraints, and institutional/regulatory characterization.

   b. Identification and preliminary evaluation of technical options.

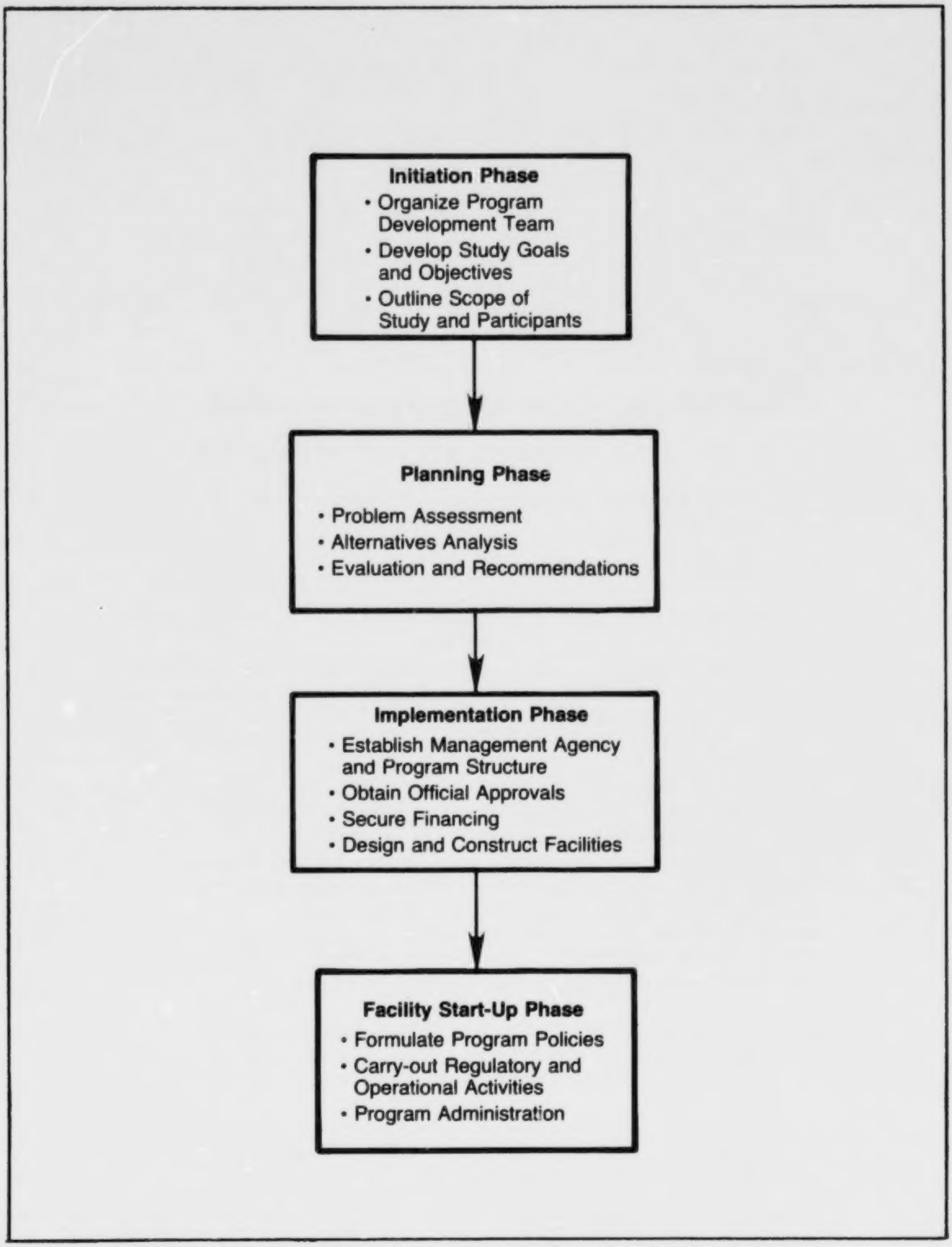

Initiation Phase
• Organize Program Development Team
• Develop Study Goals and Objectives
• Outline Scope of Study and Participants
Planning Phase
• Problem Assessment
• Alternatives Analysis
• Evaluation and Recommendations
Implementation Phase
• Establish Management Agency and Program Structure
• Obtain Official Approvals
• Secure Financing
• Design and Construct Facilities
Facility Start-Up Phase
• Formulate Program Policies
• Carry-out Regulatory and Operational Activities
• Program Administration

Figure 1. Management program development process.

c. Identification and preliminary evaluation of institutional options.

d. Formulation and evaluation of wastewater management alternatives.

   - Operations plan.
   - Financial plan.

e. Final plan recommendations.

   - Implementation plan.

3. Implementation Phase -- Design and construction of wastewater facilities, securing financing, and creation of new management entities as required. These activities take place during the Steps 2 and 3 design-construction phase of the Construction Grants program. It is important in this phase of program development to refine the elements of the management system as the following activities are accomplished:

   a. Establish the management program.

   b. Obtain official approvals and legal agreements.

   c. Secure financing for design-construction.

   d. Design and build the wastewater facilities.

4. Facility Start-Up Phase -- Day-to-day program administration and system operations involved in carrying out regulatory and operation and maintenance functions. Typical activities include:

   a. Develop and refine operational, financial, regulatory, and administrative policies.

   b. Enforce regulations.

   c. Implement policies.

   d. Inspect, maintain, and repair wastewater systems.

e. Initiate capital improvement projects.

f. Finance system operations; collect user charges.

The emphasis of this report is on the planning phase of program development, i.e., all activities involved in preparing a management plan.

The focus of this report is to assist in the preparation of a wastewater management plan, i.e., the planning phase. During the preparation of the plan, various technical and institutional issues will be evaluated in tandem. The sequence of planning activities is displayed on Figure 2. The chapters in Part II of this report provide guidance in formulating the institutional arrangements necessary to perform the required activities in the planning phase, particularly addressing:

1. Institutional/regulatory characterization (i.e., a profile of existing agency responsibilities, activities, and legal authority).
2. Description of management functions.
3. Identification and description of alternative institutional arrangements to perform management functions.
4. Procedures for analyzing alternative institutional arrangements.
5. Plan implementation requirements and mechanisms for implementing plan recommendations.

These requirements are discussed in detail in Part II of this report, in terms of the operations plan, the financial plan, and the implementation plan. Illustrative examples of these plans are developed for a hypothetical community in Chapter 2.

INSTITUTIONAL FACTORS IN WASTEWATER MANAGEMENT

Developing a sound, comprehensive wastewater management program involves consideration of applicable wastewater technologies and effective institutional arrangements. The analysis of technical options and institutional arrangements is typically a major part of the Step 1 facilities planning process. These

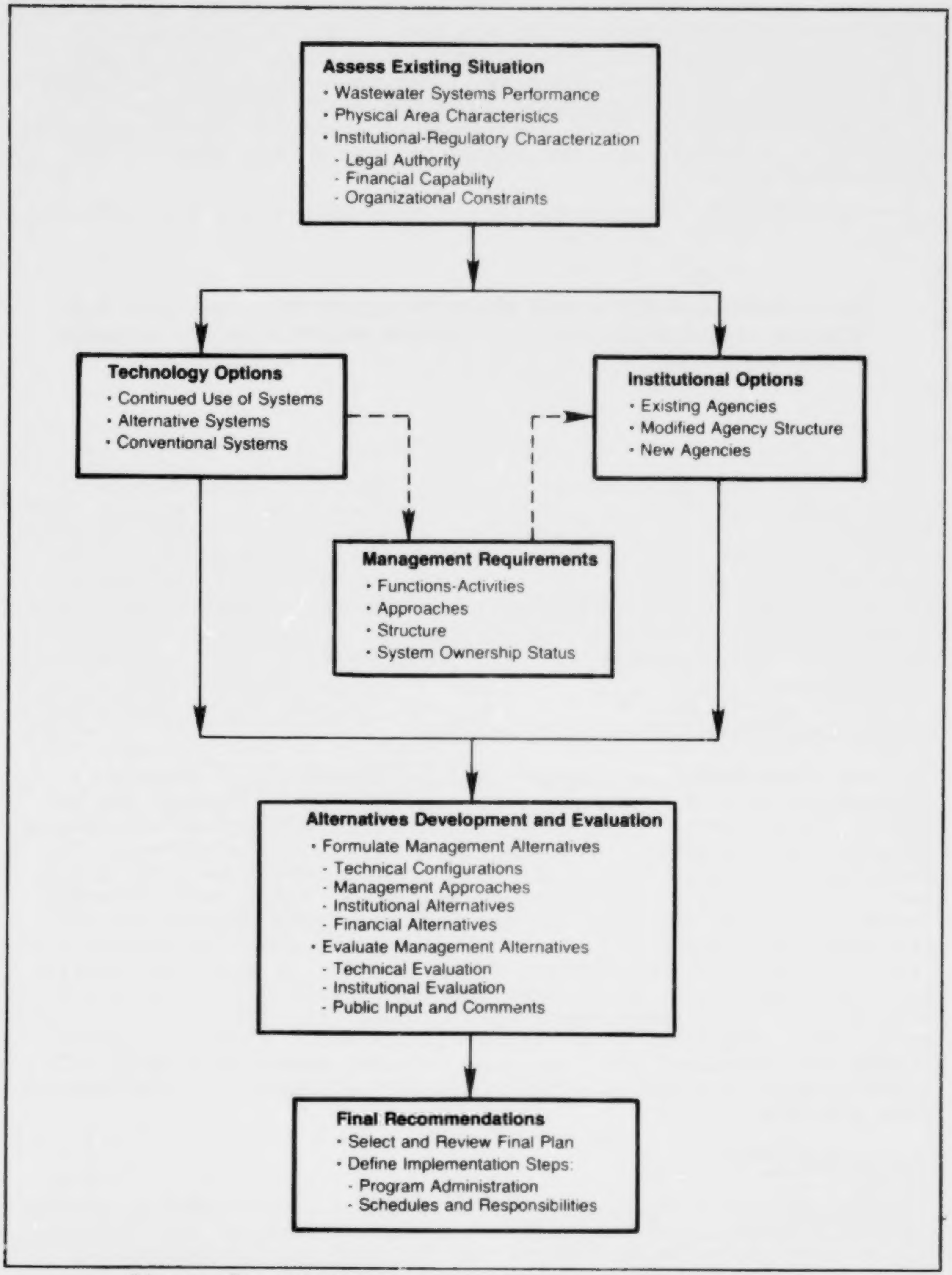

Assess Existing Situation
• Wastewater Systems Performance
• Physical Area Characteristics
• Institutional-Regulatory Characterization
- Legal Authority
- Financial Capability
- Organizational Constraints
Technology Options
• Continued Use of Systems
• Alternative Systems
• Conventional Systems
Institutional Options
• Existing Agencies
• Modified Agency Structure
• New Agencies
Management Requirements
• Functions-Activities
• Approaches
• Structure
• System Ownership Status
Alternatives Development and Evaluation
• Formulate Management Alternatives
- Technical Configurations
- Management Approaches
- Institutional Alternatives
- Financial Alternatives
• Evaluate Management Alternatives
- Technical Evaluation
- Institutional Evaluation
- Public Input and Comments
Final Recommendations
• Select and Review Final Plan
• Define Implementation Steps:
- Program Administration
- Schedules and Responsibilities

Figure 2. Wastewater management planning process.

analyses form a major part of the array of complete wastewater management alternatives which are evaluated on the basis of cost-effectiveness and environmental impact to select a recommended plan for the community. The organizational structure developed in the process will form the basis of a wastewater management program. This program will identify the methods for operating, maintaining, and financing the chosen wastewater facility.

An institutional analysis must define the appropriate dimensions of a management program, given the technical requirements of a particular wastewater system.

Several important factors must be analyzed when assessing these technical and institutional considerations. They include service area characteristics, type of wastewater system applied, scope of management functions, and alternative management approaches. These factors are listed in Table 1, as key parameters for determining appropriate management agency responsibilities. The assessment of these critical factors will help to define the dimensions and comprehensiveness of the management program.

Technical/Institutional Interactions

The successful management of on-site and small community wastewater systems involves the interface of technical and institutional issues, requiring engineering, environmental, legislative, socioeconomic, and administrative considerations. The analysis and significance of these concerns will vary on a community basis. Each state and substate political unit (township, county, village) may have unique institutional approaches for managing small community wastewater systems based on needs, perceptions, and circumstances. The formation of specific management programs for a particular community will evolve as a complex set of issues addressed by local public officials, citizens, and state regulatory agency personnel. Figure 3 illustrates the critical relationships between these technical and institutional issues which are commonly addressed in the planning process.

Management Dimensions

The initial assessment of institutional arrangements in selecting a particular management approach is one of the critical steps in formulating a program for managing small wastewater

TABLE 1. PARAMETERS FOR SELECTION OF MANAGEMENT ENTITY RESPONSIBILITIES

Service Area Characteristics

Multiple or single jurisdictional area.

Land use and population distribution.

Growth prospects.

Governmental structure and organizational arrangements.

Willingness of local agencies to accept new responsibilities.

Willingness of private homeowners to assume certain responsibilities.

Socioeconomic characteristics of service area.

Performance of existing wastewater systems.

Type of Wastewater Technology

On-site or cluster versus community treatment and disposal.

Surface versus subsurface disposal.

Level of operation/maintenance requirements.

Design and construction requirements.

Domestic waste flows versus industrial and commercial wastewater generated.

Scope of Management Responsibility

Short-term or long-term responsibility.

Remedial versus preventive solutions.

System ownership/liability responsibilities.

Regulatory or advisory perspective by management entity.

Degree of public sector involvement in management.

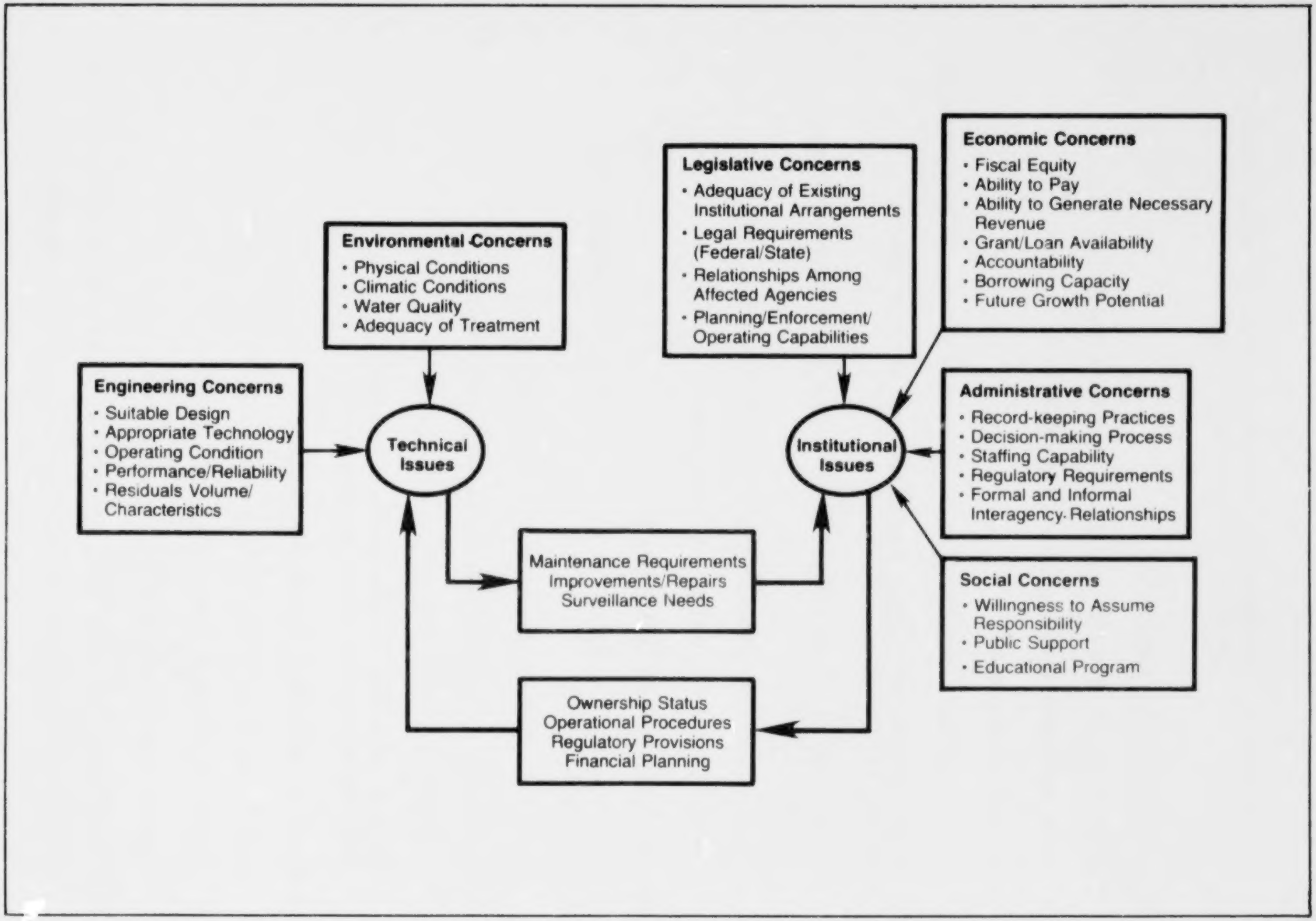

Engineering Concerns
• Suitable Design
• Appropriate Technology
• Operating Condition
• Performance/Reliability
• Residuals Volume/ Characteristics
Environmental Concerns
• Physical Conditions
• Climatic Conditions
• Water Quality
• Adequacy of Treatment
Technical Issues
Maintenance Requirements
Improvements/Repairs
Surveillance Needs
Ownership Status
Operational Procedures
Regulatory Provisions
Financial Planning
Legislative Concerns
• Adequacy of Existing Institutional Arrangements
• Legal Requirements (Federal/State)
• Relationships Among Affected Agencies
• Planning/Enforcement/ Operating Capabilities
Institutional Issues
Economic Concerns
• Fiscal Equity
• Ability to Pay
• Ability to Generate Necessary Revenue
• Grant/Loan Availability
• Accountability
• Borrowing Capacity
• Future Growth Potential
Administrative Concerns
• Record-keeping Practices
• Decision-making Process
• Staffing Capability
• Regulatory Requirements
• Formal and Informal Interagency Relationships
Social Concerns
• Willingness to Assume Responsibility
• Public Support
• Educational Program

Figure 3. Technical/institutional issues in small wastewater systems management.

systems. The assessment of institutional arrangements should define the various dimensions of the management program. The dimensions to be defined are shown in the following table.

TABLE 2. MANAGEMENT DIMENSIONS

Dimensions	Range in Concepts	
Time Frame	Interim solutions	Long-term solutions
Size	Local jurisdiction	Regional jurisdiction
Purpose	Limited purpose	Broad-based/ comprehensive purpose
Structure	Existing agency	New agencies
Authority/ Liability	Private sector/home- ... owner responsibilities	Public sector responsibilities
Staging	Phased implementation ..	Immediate start-up
Agreements	Service agreements - ... memoranda of understanding	Special legislation, codes and regulations

The time frame dimension suggests that management programs have the flexibility to provide services on either a temporary or permanent basis. Certain economic, political, and technical decisions must be made in assessing the benefits of managing wastewater systems to avoid system failures and prolong system performance life, against the risk of recurring future failures without such management. These decisions will determine when a management program should be instituted, and establish the short- and long-term objectives to be achieved.

Time Frame:

1. **Will the management program be a permanent solution or an interim measure?**
2. **Where in the process of plan development and program formulation is the user situated?**

The type of management agency and the geographical area (i.e., size) to be served are not totally independent. Service area size, together with the scope of services offered, will determine management staff needs. This in turn affects the choice of a management agency. Figure 4 illustrates the concern for size, choice of management agency, and services provided. A special district created by a rural community, for example, may not be well suited to provide technical support services to a county or watershed. At the same time, consolidation of responsibilities in a single entity can offer a mechanism for providing expertise and skills (normally beyond the means of small communities) to perform system design, installation, operations, and financing duties for the entire region.

Size:

1. **What is the geographic size of the area to be served?**
2. **Is the area compatible with a local public jurisdiction?**
3. **Is sufficient manpower available within an institutional structure to service the area under study?**
4. **Does service area size affect the type of institution required to manage the wastewater systems?**
5. **Does service area size affect the type of technologies to be considered (and, in turn, the needed management functions)?**

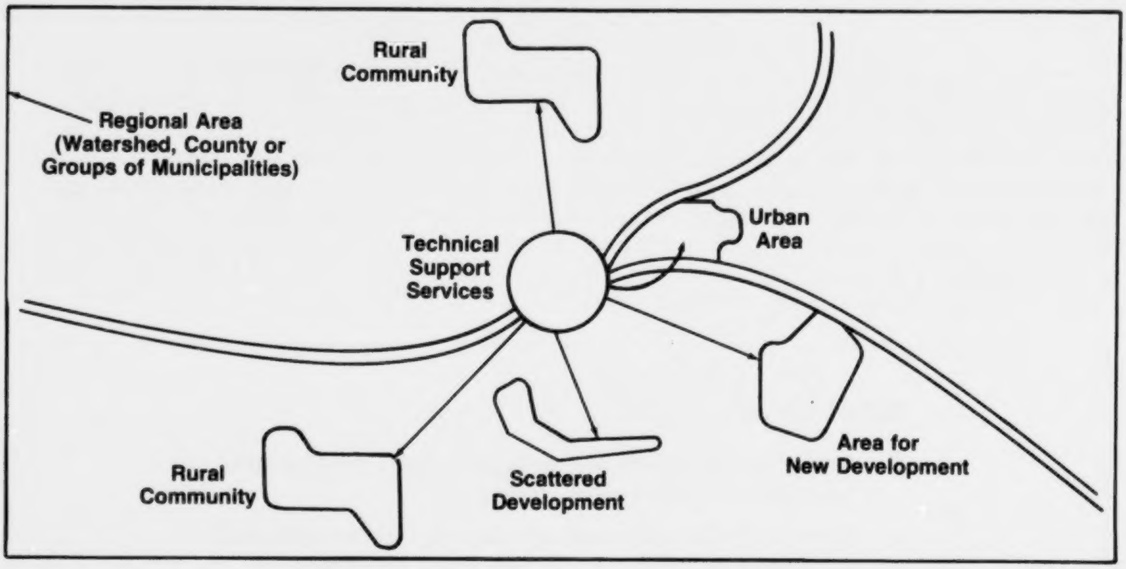

Rural Community
Regional Area (Watershed, County or Groups of Municipalities)
Urban Area
Technical Support Services
Area for New Development
Rural Community
Scattered Development

Figure 4. Areawide technical support services for wastewater management systems.

For these reasons, alternative approaches and policies regarding the size of the area to be served and the type of management agency to be formed should be evaluated together.

A management program can have a single or multiple purpose related to providing wastewater, water supply, and septage management services. The program may be one of the general public services a local government provides, or the program can be oriented solely for the purpose of wastewater management. Regardless of the objectives of the program, wastewater management policies should at least be coordinated with the local public service programs and land use policies.

Purpose:

1. **Should the management program be limited to wastewater management, or should other utilities be included (e.g., water supply)?**
2. **What is the range of functions to be provided (i.e., a broad set of management functions or only a few functions)?**

The management program purpose also helps to define the types of functions which constitute its administrative, regulatory, and operational components. (See Figure 5.) Basic choices regarding the type of functions to be provided will affect the responsibilities that management entities must accept.

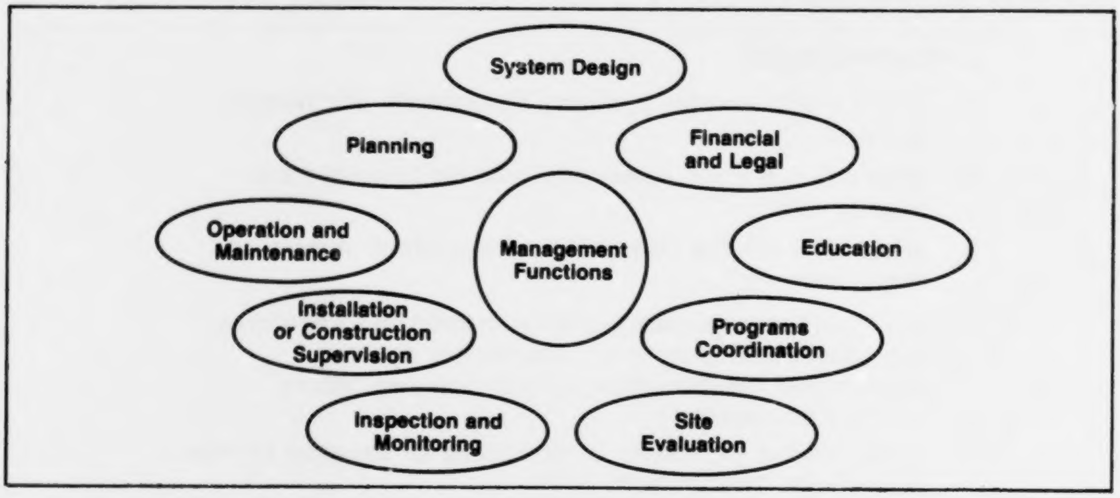

System Design
Planning
Financial and Legal
Operation and Maintenance
Management Functions
Education
Installation or Construction Supervision
Programs Coordination
Inspection and Monitoring
Site Evaluation

Figure 5. Management functions.

The structure of the organization will depend on pertinent statutory authority and enabling legislation that define the composition and responsibilities of various entities. The determination of structure will also depend on the capability and willingness of existing agencies to perform management functions. New organizations may be created or existing agency functions can be reorganized in determining structural requirements.

Structure:

1. **Can new agencies be created to provide management functions on a localized basis, or can existing ones be modified?**
2. **How will the agency be staffed; full-time employees, part-time employees, volunteers, or contract to private firms?**
3. **What will be the organizational relationship between the management agency and the participating municipalities?**

Local management approaches should explicitly identify authorities and liabilities assumed by management agencies, property owners, installers, septage haulers, consultants, etc. The delegation of authority will affect many management functions. The degree of public sector involvement and authority in performing management functions is a key dimension that distinguishes various wastewater management approaches. The extent of authority assigned the management agency will determine the scope of its duties, the finances required for operation, and the personnel necessary to perform its functions.

Authority/Liability:

1. **Will the wastewater systems be publicly or privately owned?**
2. **How will the wastewater systems be operated and maintained?**
3. **Who will bear the costs of future system repairs and replacements?**
4. **Will existing regulatory entities continue to exercise regulatory authority over wastewater system design and maintenance, or will new regulatory entities be created?**
5. **How will the necessity of replacing an existing on-site system be determined?**
6. **Will both existing and new on-site systems be included in the management program or only new systems?**
7. **What is the extent of authority to be provided; advisory, managerial, or regulatory?**

Liability issues become pronounced when decisions are made regarding local government involvement in wastewater management responsibilities. Many times local governments appear to be reluctant to become directly involved in wastewater management activities, even though they may already have the power to do so. Inspecting both functioning and malfunctioning systems, for example, places a certain degree of liability or risk on the inspecting agency. Agency officials, for example, worry about damaging the wastewater system during the inspection process. They are also concerned that homeowners will blame the inspecting agency for future problems with the system. These inspections can take place in the facilities planning and design process, as well as during operational activities of a management program.

Many technical decisions must be made before the management design process is completed. Performing all functions related to the implementation of technical plan recommendations, e.g., acquiring easements and land for cluster systems or septage disposal sites, may affect the implementation of the management program. Certain powers may need to be exercised (e.g., property rights acquisitions, condemnation proceedings) before others (e.g., system design and construction), which would affect the management program design and implementation process. Also, additional functions may be added after system construction. The point of intervention of these decisions and actions in the planning process also affects management program design. Assessing where you are in the program formulation process, i.e., in initial planning phases, design-approval phases, or post-construction/operational phases, is a critical concern in influencing the staging of program powers and authority.

Staging:

1. **How will future system extensions be determined?**
2. **When is public agency intervention in the planning process and program formulation process required?**

Assigning responsibilities for wastewater management to certain entities, necessitates the preparation of certain legal agreements (e.g., codes and ordinances). This is a very important step in the management program formulation process, and is one which is not to be taken lightly. Obtaining agreements among agencies, between public and private entities, and adopting the necessary legislation and regulations must be accomplished before the overall composition and structure of the management program can be finalized.

Agreements:

1. **Does adequate legal authority exist?**
2. **Do new or modified interagency arrangements, legislation, or ordinances need to be established?**
3. **Do agreements with property owners need to be acquired?**

This chapter has highlighted the major factors to be considered in developing institutional arrangements for a particular area. The discussion has pointed out several significant institutional, attitudinal, and technological barriers that inhibit the widespread application of small wastewater systems management programs.

Overcoming these institutional and attitudinal barriers necessitates the following actions:

1. The process of allocating grants for wastewater facility planning, design, and construction from numerous Federal agencies to state and local entities should be simplified and publicized to facilitate participation of small communities in wastewater management planning.

2. Educational and public awareness programs are necessary to increase the visibility and applicability of small flows management programs to both the professional and nonprofessional community.

3. Institutional relationships, legislation, and regulations pertaining to small flows systems should be clear and effective.

4. Guidance concerning acceptable management approaches and institutional arrangements should be made available to state and local planners and engineers.

5. The special characteristics of small communities need to be recognized and properly dealt with by state officials and consultants in order to prepare implementable plans.

Providing guidance for developing the institutional requirements for a comprehensive, well-structured management program is a major objective of this document.

CHAPTER 2

MANAGEMENT PROGRAM DEVELOPMENT EXAMPLE

This chapter illustrates a procedure for developing institutional arrangements for managing wastewater treatment and disposal facilities for small communities, utilizing a hypothetical community situation. The purpose of this hypothetical community example is to identify the various institutional conflicts that arise and related decisions that are made during the first two phases of management program development; the initiation phase and the planning phase. These activities are typically addressed in facilities planning, i.e., Step 1 of the Construction Grants Program.

Suggestions on the type of information that should be developed at different points in the planning process and how the information should be applied is also described. The chapters in Part II present more detailed information to support the analysis sequence used for the example presented here.

CASE STUDY BACKGROUND

The example used throughout this chapter will refer to a hypothetical service area consisting of the corporate limits of two neighboring rural communities, Easttown and Westtown. The following are important community features:

1. There are about 450 homes in the two towns, which are predominantly older homes on small lots.

2. The towns are nearly completely built-up and have no growth projected over the next 20 years.

3. On-site systems, including septic tank-soil absorption systems, cesspools, and straight pipe discharges to streams, are currently employed. In Easttown and Westtown, about 20 percent and 15 percent, respectively, of the homes, have failing on-site systems.

4. The towns have a high proportion of households with fixed incomes and limited ability to pay for improved wastewater services.

Due to the perceived health and pollution problems associated with failing on-site systems, the enforcement section of the state environmental protection agency threatened legal action against the town residents whose systems were malfunctioning (as evident through surface breakouts and straight-pipe discharges to the surface water).

The towns entered into a facilities planning process to determine the most feasible, cost-effective method of wastewater treatment and disposal. Several wastewater management options were evaluated in the planning process. A combination of individual and small community systems was determined to be the best technical solution, and a management authority was formed to design, build, and administer the operation of the community systems and manage existing and future individual systems in the service area.

INITIATION PHASE

Organizing a program development team was a key activity in this initial phase of the planning process in Easttown and Westtown. Each town set up a sewer advisory committee made up of elected officials and selected local residents. (Persons with engineering, business finance, and law backgrounds were represented on the committee.) Neither town had a full-time professional staff to guide the facilities planning activities. The water resource planning section of the state environmental protection agency (which is in charge of administering the Construction Grants Program) offered assistance to the towns in retaining a consultant and organizing the public participation effort. A county-based cooperative extension service agent served as a special advisor to the towns, and provided an important liaison and coordination role between the towns, and among the other participants -- the state, county, consultant, general public, and news media.

The county agencies decided not to directly participate in the initial planning phase, because of a lack of familiarity with small community wastewater technology and initial reluctance to become involved in performing any of the system management activities. This situation illustrates some of the political difficulties faced by small communities in dealing with other levels of government.

Information presented in Chapter 3, "Selecting a Management Agency," and Chapter 6, "Formulating an Implementation Plan," will be helpful in identifying potential participants in the program development team.

PLANNING PHASE

The principal analysis steps in the planning phase (and associated references to Part II of this report), as generally described in the previous chapter, include:

Step	Reference
Step 1 -- An evaluation of the physical characteristics of the community and an assessment of existing and optional wastewater technology.	The technical evaluation steps are conducted as part of the technical plan analysis.
Step 2 -- An institutional analysis of existing agencies and an identification and preliminary evaluation of institutional options.	These institutional analysis steps are conducted in Chapter 3 of this report, "Selection of the Management Agency."
Step 3 -- The formulation and evaluation of wastewater management alternatives.	Information necessary to formulate and evaluate management alternatives is available in Chapters 4 and 5 of this report; "Formulating an Operations Plan," and "Formulating a Financial Plan."
Step 4 -- Implementation plan.	This final step is presented in Chapter 6, "Formulating an Implementation Plan."

Step 1: Identification and preliminary evaluation of technical options.

Based on an assessment of septic system operational performance, soil characteristics, and other physical study area characteristics, technical alternatives are evaluated. In this case the following general technical options were prepared for preliminary consideration:

> Option 1 -- Correct Problems on an Individual Basis -- This option requires the individual property owner to make necessary repairs or improvements to his on-site system at his own expense. There would be no Federal or state funding, and in some cases an on-site solution might not be possible due to physical constraints.
>
> Option 2 -- On-Site/Cluster System -- Serve only problem areas with centralized collection and treatment/disposal facilities, creating "cluster" systems. Homes outside these service areas would continue to rely on on-site systems, but a publicly-operated maintenance program would be required to ensure proper management of individual systems.
>
> Option 3 -- Communitywide Collection/Treatment System -- Each town would be connected to its own central treatment facility. Some form of sewer collection system would serve all residential and nonresidential units within each town's limits.
>
> Option 4 -- Joint Collection/Treatment System -- The sewage from both towns would be collected and treated at one central treatment facility. The economies of scale should result in a relatively lower cost per unit served.

The wastewater technologies determined to be most appropriate in this case, under the various technical options considered, are given in Table 3.

TABLE 3. APPROPRIATE TECHNOLOGIES FOR EASTTOWN AND WESTTOWN

Option	Type(s) of Wastewater Systems Involved
Correct problems on an individual basis	Standard individual septic tank and drainfield as allowed under existing state regulations. Alternative on-site systems (e.g., mound, pressure dosing, etc.) as approved by state regulatory agency.
On-site/cluster system	Standard and alternative on-site systems as above. Small community collection and treatment/disposal systems (e.g., small diameter gravity, vacuum, or pressure sewers and dosing/mounds) serving clusters of homes.
Separate communitywide collection/treatment systems	Septic tank effluent pump (STEP) pressure sewer system with centralized treatment facility (facultative lagoon and spray irrigation).
Joint collection/ treatment system.	Same as for communitywide system.

Step 2: Institutional analysis of existing agencies and identification and preliminary evaluation of institutional options.

This step begins to address the selection of management agencies. The purpose of this task is to identify and screen likely candidates based on their legal and general administrative capabilities to manage the wastewater technology under consideration. The agencies selected to perform management functions must be vested with the powers necessary to efficiently manage the wastewater systems involved.

Existing agencies and wastewater management responsibilities in the study area include:

1. State Department of Health -- Enforcement of state sanitary code governing on-site and alternative wastewater systems (i.e., non-surface water discharges).

2. State Environmental Protection Agency -- Enforcement of regulations governing surface-water discharges, issuance of NPDES permits, and general water quality protection responsibilities. Administration of the EPA Construction Grants Program.

3. County Departments of Health -- Authority to implement the state sanitary code through permitting on-site systems, inspecting and ordering repairs of failing systems.

Various legal and organizational characteristics of local agencies which are authorized under state enabling legislation to perform wastewater management functions (i.e., incorporated towns, sewer utility districts, and sewer authorities), appear in Tables 4 and 5. Limited interviews with existing wastewater management agencies and a detailed review of enabling legislation, present operating powers, and ordinances will be necessary to complete Tables 4 and 5.

As shown in the tables, each agency generally has sufficient legal authority for providing management requirements. In this example, the County Department of Health, however, is more effective in providing regulatory functions rather than financing functions for the locality. One potential statutory drawback of the district and authority options is the lack of clear legal capability to enter private property to perform on-site system inspections and correct problems. The enabling legislation does define the ability of a district and authority to inspect and maintain sewerage systems (connecting more than one home), but not individual systems. Depending on the legal interpretation of state enabling legislation, the management agencies being considered may not have the specific legal authority to carry out certain necessary functions.

Two approaches to solving this problem are to petition the legislature to either enact special legislation authorizing the creation of entities with explicit on-site management responsibilities, or to change state laws that define the powers of existing central wastewater system management entities (by allowing them to manage on-site systems). If it appears unlikely

TABLE 4. PERTINENT CHARACTERISTICS OF CANDIDATE MANAGEMENT AGENCIES

Institution	Applicable Statute Citation	Jurisdiction - Service Area	Formation	Governing Body	Comments
Incorporated	Town charter	Town limits	Existing agency	Town council	Towns provide limited public services.
County utility district	State code	Any contiguous territory within county	Petition by voters or resolution by county supervisors	County supervisors	Several utility districts already established within the county.
Water or sewer authority	State code	County, city, town, village, or any combination	Resolution by governning body authorizing a local referendum	Board of at least five members, appointed by governing body.	A few authorities exist in county.
County health department	State code and county ordinance	County	Existing agency	County supervisors	Full range of on-site system enforcement authority.

TABLE 5. MANAGEMENT REQUIREMENTS ASSESSMENT MATRIX

Management Requirements	Institutions											
	Towns			Sewer Utility Districts			Sewer Authority			County Health Department		
Administrative Requirements	Yes	No	Partial	Yes	No	Partial	Yes	No	Partial	Yes	No	Partial
• System ownership capability	X			X			X			X		
• Enter contracts	X			X			X			X		
• Acquire property	X			X			X			X		
• Sue or be sued	X			X			X			X		
Regulatory Requirements												
• Set rules and regulations	X			X			X			X		
• Enforce rules and regulations	X			X			X			X		
• License private contractors			X			X		X		X		
• Require connection to facility or participation in management program	X				X			X				X
Operation and Maintenance (O&M) Requirements												
• Access to private property			X			X			X	X		
• Establish O&M standards			X		X				X	X		
• Perform periodic inspections			X			X			X	X		
• Enforce repairs			X			X			X	X		
• Compliance monitoring			X			X			X	X		
Financing Requirements												
• Set user charges and fees	X			X			X					X
• Collect user charges and fees	X			X			X					X
• Accept grants	X			X			X			X		
• Incur debt	X			X			X					X
• Issue revenue bonds	X			X			X			X		
• Issue general obligation bonds	X			X				X				X
• Require performance bonds	X			X			X			X		
• Assess property taxes	X				X			X			X	
• Levy special assessments	X			X			X					X
• Establish reserve funds	X			X			X			X		

that necessary enabling legislation will be enacted, other management options must be considered. (These options are discussed in subsequent steps of the analysis.)

Other institutional issues identified through the institutional analysis include:

1. The state agencies, and County Department of Health staffs expressed concern over reviewing and approving certain types of innovative and alternative technology, particularly those which were not currently used in the state and were not explicitly addressed in the state regulations.
2. The County Health Department staff suffered from a lack of manpower and expertise in soils science. The staff was also not familiar with alternative wastewater system technology design, installation, or operational requirements. The existing county regulations were also assessed as being in need of updating to require more extensive site evaluations and to provide alternative system designs, particularly in marginal soils.
3. The County Health Department (i.e., County Board of Health) also did not wish to become directly involved in managing an on-site wastewater program for the two communities under study. Existing state legislation, however, allowed the delegation of County Health Department responsibilities to local governments.
4. The County Engineering Department, an existing wastewater management entity, owned and operated wastewater treatment and water supply facilities in other parts of the county. This agency (and county supervisors) did not appear interested, at first, in becoming involved in wastewater management activities in the service area, unless conventional wastewater systems would be used.
5. Neither town had a professional staff which could perform maintenance activities. Easttown had a central water system with one full-time water operator. Westtown relied on individual

private wells for its water supply, and had one full-time town clerk as the only town employee. Both towns had part-time road maintenance employees.

These issues must be taken into account in the delegation of agencies to participate in management program duties as addressed in the next analysis step. Based on the analysis of legal and administrative capability accomplished in this step, each of the four institutional options listed in Tables 4 and 5 would be considered a candidate for the management agency descriptions, subject to further analysis in the steps to follow.

Step 3: Formulation and evaluation of wastewater management alternatives.

This step in the planning phase combines the results of the previous two steps; preliminary technical analysis and preliminary institutional analysis, to generate a number of wastewater management alternatives for detailed consideration. Wastewater management alternatives for a study area can be made up of various service area configurations, a mix of wastewater system technologies, and different institutional arrangements for managing these systems. The number of wastewater management alternatives to be evaluated in this step of the planning process will depend on the various combinations of technology, service area delineations, and institutional arrangements which appear to be feasible.

To simplify this example, a single technical option is assumed to be feasible after the preliminary technical evaluations. The "on-site/cluster system" has been selected as the preferred technical option. Figure 6 shows the general layout of the on-site/cluster system option.

The assessment of the institutional components for the technical option is done through two activities:

1. The definition of institutional arrangements for carrying out certain management functions (operations plan preparation).

2. The determination of the system capital and operating costs (financial plan preparation).

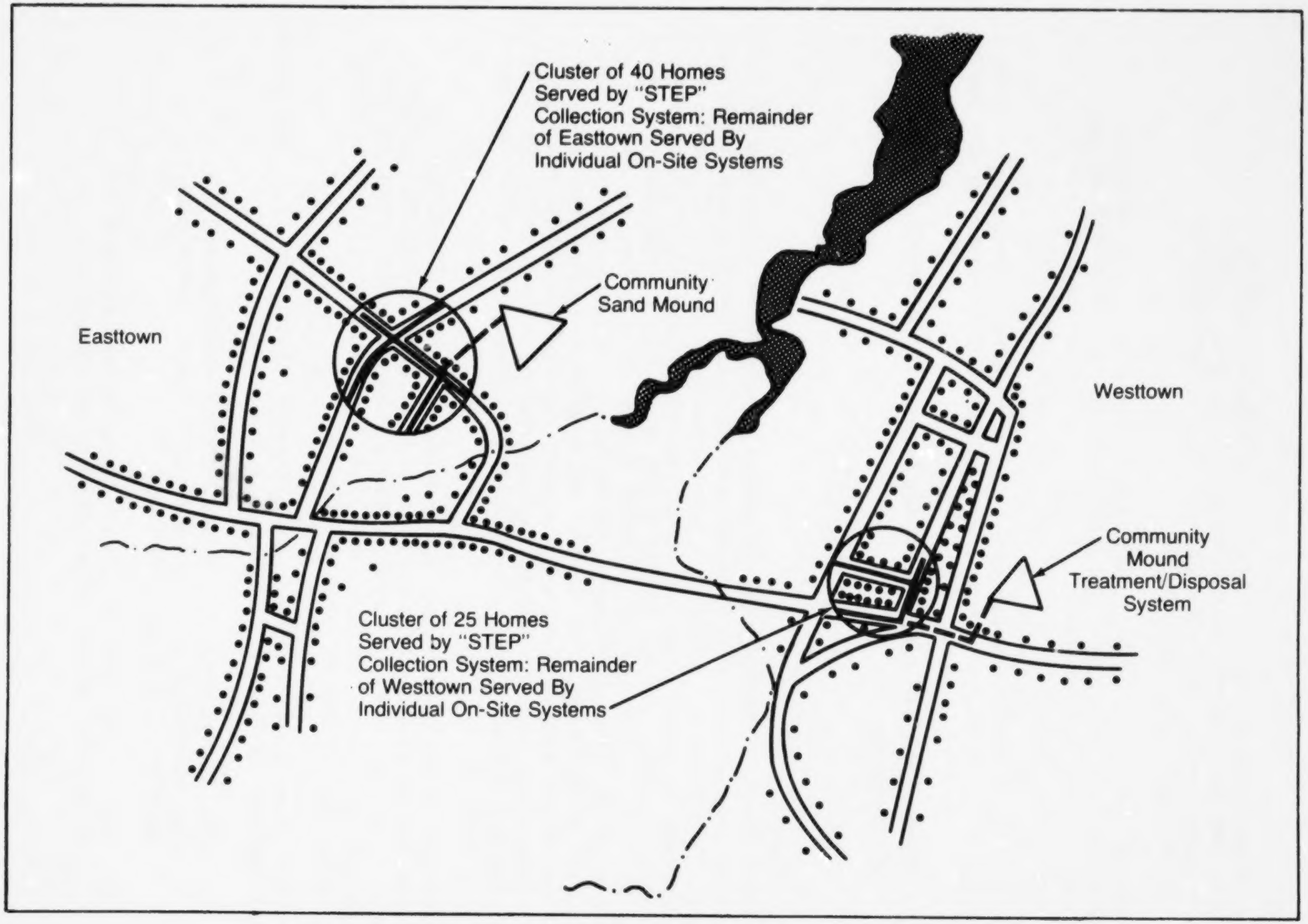

Cluster of 40 Homes Served by "STEP" Collection System: Remainder of Easttown Served By Individual On-Site Systems
Community Sand Mound
Easttown
Westtown
Community Mound Treatment/Disposal System
Cluster of 25 Homes Served by "STEP" Collection System: Remainder of Westtown Served By Individual On-Site Systems

Figure 6. On-site/cluster system for Easttown and Westtown.

These two key institutional analysis activities commonly addressed in evaluating wastewater management alternatives are described in the following discussion of operations plan and financial plan preparation.

Preparation of an Operations Plan

An operations plan describes how design-installation and operation-maintenance functions will be carried out. The plan specifies who will provide these functions, and how they will be carried out. Guidance for preparing an operations plan is contained in Chapter 4, "Formulating an Operations Plan." The preparation of an operations plan involves the following activities:

1. Defining the required management functions.
2. Developing general approaches to system ownership and operation.
3. Assessing administrative and legal capabilities of existing and new agencies to provide management functions.
4. Selecting and formulating institutional arrangements.

The preparation of an operations plan is initiated by the determination of functional requirements of the management program. This is done by identifying specific management requirements for the on-site and small community system technologies.

Approaches to system management can then be developed in a preliminary fashion. On-site and small community systems can generally be owned and operated in the following ways:

1. Privately-owned and operated.
2. Privately-owned and operated within the guidelines of a public entity (e.g., through maintenance permit provision).
3. Privately-owned and publicly-managed.
4. Publicly-owned and managed.

The roles and responsibilities of various entities that currently provide on-site system management in Easttown and Westtown are displayed in Table 6. It basically shows the involvement of the County Health Department in various phases of on-site system-installation, while operation-maintenance remains with the property owner. Follow-up discussions with County Health Department staff and County officials helped to demonstrate numerous logistical, manpower, and administrative constraints associated with regulating the maintenance of on-site systems within the case study service area. For this reason, the involvement of a local entity (e.g., town, sewer utility district or sewer authority), particularly in operation and maintenance responsibilities was evaluated in subsequent institutional analysis activities. Management functions that required the participation of local entities (or the property owner) are identified with an asterisk (*) in Table 6.

As noted earlier, explicit legislation creating on-site management districts and allowing a public entity to enter onto private property to conduct on-site systems inspections was not available for application. In lieu of such specific legislation, the following options were reviewed:

1. Obtain a service agreement with each resident with an on-site system. The service agreement would indicate the homeowner's and local entity's responsibilities in system maintenance and would allow the entity access to the on-site system for inspection purposes.

2. Obtain easements to the on-site system.

3. Purchase the on-site system (i.e., public ownership of the system).

4. Require property owners with on-site systems to establish service contracts with private firms. The firms would report results of the inspections and any septage hauling to a designated local entity.

Questions relating to the ownership and operation of the cluster (i.e., community) systems were also key concerns. In this case, it was assumed that the common collection lines would be publicly-owned and operated, while the individual pump units could be either privately-owned and operated, or publicly-owned and operated. For purposes of the operations plan, it was decided that a single agency would be assigned the responsibility for operation and maintenance of the collection lines and effluent disposal sites. It was also necessary that the management

TABLE 6. FUNCTIONAL RESPONSIBILITIES MATRIX -- EXISTING ARRANGEMENT

Identify specific management agency (i.e. special district, municipal authority, municipal government, county agencies, regional agencies, State agencies, Federal agencies, private organizations, and other groups) and indicate responsibilities of each agency

	State Health Dept.	County Health Dept.	Towns	Homeowners	Private Firms			Comments
Planning/Administration								
Plan preparation			●					
Plan review coordination	●	●	●					
Research and development	●							
Office and staff management		●						
Site Evaluation								
Guidelines and criteria	●							
Evaluation certification		●						
Site suitability analysis					●			
System Design								
Standards and criteria	●							
Designer certification								Not done
System design					●			
* Design review		●						
Permit issuance		●						
Installation								
* Construction supervision		●						
Installer certification								Not done
* Record-keeping		●						
Permit issuance		●						
Operation and Maintenance								
* Procedures and regulations								Not done
Operator/inspector certification								Not done
* Routine inspections								Not done
* Emergency inspections		●						
* System repair/replacement				●				
* Repair supervision		●						
Performance certification								Not done
System ownership				●				
Residuals Disposal								
Disposal regulations	●							
* Hauler certification	●							
Record-keeping		●						
Equipment inspections		●						
Facility inspections		●						
Facility operation					●			
Financing								
* Secure funding								Not applicable
* Set charges								Not applicable
* Collect charges								Not applicable
Monitoring								
* Reporting system								Not applicable
Sampling	●							
Public Education								
Develop methods	●							
* Disseminate information	●							
* Respond to complaints		●						

* Management functions that require local agency input.

agencies be public entities, since EPA Construction Grant rules specify that property owner associations are private entities and are ineligible for grant funds.

Institutional options for carrying out activities normally defined through an operations plan are described in Table 7 and as follows:

1. All on-site systems would remain under private ownership. The cluster systems would be owned and operated by each town. The County Health Department would regulate system design-installation and operations-maintenance, with the towns participating in some of the system inspection and administrative activities. (Option 1.)

2. A sewer authority would be established to own and operate the cluster systems. The on-site systems would remain in private ownership. The sewer authority could become involved in on-site system regulation and maintenance with the County Health Department. (Option 2.)

3. A county sewer utility district would be established to own and operate the cluster systems. The on-site systems would remain in private ownership. The County utility district could become involved in some on-site system regulation and maintenance activities with the County Health Department. (Option 3.)

The evaluation factors that were used to choose the preferred management arrangement include:

1. Legal authority to provide management functions.

2. Capability and willingness to perform administrative duties.

3. Political acceptability and public support for the arrangement.

After assessing the relative merits and drawbacks of these institutional options, Option 2, the sewer authority arrangement, was determined to be the most feasible.

TABLE 7. INSTITUTIONAL OPTIONS FOR EASTTOWN/WESTTOWN WASTEWATER MANAGEMENT PLAN

Functions	Option 1	Option 2	Option 3
On-site ownership	Homeowner	Homeowner	Homeowner
Cluster ownership	Towns	Sewer authority	County utility district
Design regulation	County Health Department	County Health Department	County Health Department
System inspections	County Health Department/ towns	County Health Department/ sewer authority	County Health Department/ county utility district
Routine maintenance	County Health Department/ towns	County Health Department/ sewer authority	County Health Department/ county utility district
Collect fees	Towns	Sewer authority	County utility district
Advantages	1. Involves a local entity (town) in managing wastewater systems.	1. Provides a common focus of local activities via the sewer authority. 2. Gives the towns equal status in decision-making (via Board of Directors).	1. County utility district gives opportunity to expand wastewater management services to other parts of the county.
Disadvantages	1. Each town must provide services, separately. 2. Towns have limited capability to provide services.	1. Involves the creation of a new agency.	1. County elected officials are reluctant to become involved in small wastewater systems management.

Recommended Operations Plan
On-Site Cluster System

A joint-sewer authority would be established to serve as the principal administrative entity for managing both the on-site and cluster systems in the two towns. The sewer authority would maintain a staff to conduct system inspections, collect fees, and coordinate with the county health department, state regulatory agencies, and local governments to enforce program objectives.

The on-site systems would remain under private ownership. A service agreement would be established with each property owner with an on-site system to enable the sewer authority to conduct its inspections. The cluster system would be owned by the sewer authority, and similar service agreements (and easements) obtained.

The preferred institutional arrangements for managing the on-site cluster system are summarized in Table 8.

Cost information developed in the financial plan will provide the essential information for preparing a final wastewater management plan, and assigning institutional arrangements for system financing.

Preparation of a Financial Plan

A financial plan is designed to provide a mechanism for determining how system costs will be allocated to the service area residents. Vital inputs to the process of developing a financial plan include the results of the operations plan, i.e., the definition of organizational arrangements for system design-installation and maintenance, and the technical plan (particularly for user cost calculations). The analysis conducted in the financial plan refines the decisions made in the operations plan to a certain extent, and develops cost estimates so that system users will be better able to understand the financial impacts of the wastewater management alternatives. It is often on the basis of cost to the user (in addition to system effectiveness and reliability) that certain wastewater management alternatives are ruled out from further consideration.

The activities involved in the preparation of a financial plan include:

1. Calculation of the local share of capital costs.

TABLE 8. FUNCTIONAL RESPONSIBILITIES MATRIX -- PROPOSED ARRANGEMENT

Identify specific management agency (i.e. special district, municipal authority, municipal government, county agencies, regional agencies, State agencies, Federal agencies, private organizations, and other groups) and indicate responsibilities of each agency

	State Health Dept.	County Health Dept.	Towns	Homeowners	Private Firms	Sewer Authority	Cooperative Ext. Service	Comments
Planning/Administration								
Plan preparation						●	●	
Plan review coordination								
Research and development	●							
Office and staff management						●		
Site Evaluation								
Guidelines and criteria	●					●		
Evaluation certification		●				●		
Site suitability analysis					●			
System Design								
Standards and criteria	●					●		
Designer certification								Not done
System design					●			
Design review		●				●		
Permit issuance		●						
Installation								
Construction supervision						●		
Installer certification								Not done
Record-keeping						●		
Permit issuance		●						
Operation and Maintenance								
Procedures and regulations	●					●		
Operator/inspector certification	●							
Routine inspections						●		
Emergency inspections		●				●		
System repair/replacement				●				
Repair supervision						●		
Performance certification						●		
System ownership				●		●		
Residuals Disposal								
Disposal regulations	●							
Hauler certification						●		
Record-keeping						●		
Equipment inspections		●						
Facility inspections		●						
Facility operation					●			
Financing								
Secure funding						●		
Set charges						●		
Collect charges						●		
Monitoring								
Reporting system						●	●	
Sampling						●		
Public Education								
Develop methods						●	●	
Disseminate information						●	●	
Respond to complaints						●		

2. Estimation of annual operating costs and associated manpower requirements.

3. Calculation of average annual user costs for alternatives comparison, taking into account expected population changes in the service area.

4. Determination of how costs will be allocated to system users.

Procedures to carry out these activities are explained in Chapter 5, "Formulating a Financial Plan."

The results of the first activity for the Easttown/Westtown example, calculation of the local share of capital cost, are summarized in Table 9.

In conducting the second activity, estimating operating costs, it is necessary to know:

1. The functions which are to be provided, their frequency of service, and number of applicable users.

2. The manpower requirements and associated salaries and fees to perform these functions.

3. The property owner versus management agency responsibilities in carrying out functions (particularly system correction and replacement).

Table 10 presents a detailed procedure, using this example, for calculating staff needs for the proposed wastewater management option. The calculations on this table yield estimates of total annual staff for the proposed sewer authority; specified as technician/inspector, managerial, and clerical categories. According to the calculation results, the management program will require the services of a part-time inspector (for approximately one-half of a person-year), and manager (serving about one-half day per week). Part-time clerical support would be necessary.

Workday estimates serve as input to another table, Table 11. Annual operating expenses for the management program are also presented in this second table.

Average annual user cost estimates derived from previous calculations are presented on the following page.

Annual User Costs

Annual local share (Table 9, item 6)	$64,200
Operating costs (Table 11)	21,120
Total annual costs	85,320
Total future users (no growth projected)	450
Average annual cost per user	190

Note: Average user cost estimates do not necessarily reflect actual user charges (see Table 13).

The average user cost does not necessarily reflect the amount a specific user will end up paying in user fees. It may be desirable to convert the average user cost to an actual expected cost to specific users for more accurate assessments. Alternative cost-sharing arrangements which should be investigated to prepare a more realistic representation of user costs include:

1. Service charges for specific services.
2. Fixed and variable charges (including assessments, connection fees, and service fees) to cover a full range of service and capital costs.
3. Property tax assessments to augment or substitute for service charges or user charges.

Determining which financing method to apply depends not only the technology requirements and management approach adopted, but on the extent to which the program costs can be equitably shared among all users. The choice of a particular financing arrangement is, therefore, based on whether the community as a whole wishes to share the costs of program administration, operating expenses, and debt service equally among all users or whether individual users are to pay according to the actual services rendered to their systems. The former approach is one that equalizes the costs of system replacement and operation among all users over the life of the project. The latter

TABLE 9. ON-SITE/CLUSTER SYSTEM CAPITAL COSTS (1980 $)

		Easttown	Westtown	Total
1.	Initial Capital Costs	1,194,000	528,000	1,722,000
2.	Future Capital Improvements	246,000	243,000	489,000
3.	Total Project Costs	1,440,000	771,000	2,211,000
4.	Grants	979,000	433,000	1,412,000
5.	Total Local Share	461,000	338,000	799,000
6.	Annual Local Share	37,000	27,200	64,200

Notes:

1. Total capital costs includes engineering fees, legal fees, land costs, right-of-way costs, etc.
2. Represents the present value of future on-site system rehabilitation and pump replacement over a 20-year planning period.
3. Total project costs represent initial and future capital costs over a 20-year planning period.
4. Grants from EPA and the state covering 85 percent and 10 percent of the eligible initial capital costs.
5. Total local share equals initial capital costs plus future capital improvements (during 20-year planning period) minus grants.
6. Annual local share financed through a bond of 7 percent at 30 years (capital recovery factor of 0.08059).

TABLE 10. CALCULATION OF MANAGEMENT AGENCY STAFF

Management Activity Description	Implementing Agency	Calculations and Assumptions	Annual Workday Requirement by Staff Type
New Installations Site evaluations Design review Permit issuance Installation supervision	County health department to issue permits and inspect installations. Sewer authority staff will assist in installation supervision. Private contractor and property owner conduct site evaluation and prepare designs.	On-Site Systems Four new septic systems built each year for 20 years. Four new systems x 1 day/system = 4 working days/year for the sewer authority.	4 (1)
		Cluster System No additional connections assumed.	
System Maintenance Periodic inspections Service calls Customer relations Violation notices Permit renewal Recordkeeping	Sewer authority will maintain systems. County health department will issue violation notice based on sewer authority referral. Mandatory maintenance permit approach would be used (with inspections) for on-site systems.	On-Site Systems Inspect every three years. $\frac{400 \text{ systems}}{3 \text{ years}} = 133$ systems/year Assume inspection rate of three systems per day to schedule, inspect, and report findings. $\frac{133 \text{ systems}}{3} = 45$ days/year	45 (1)
		Cluster System Biennial inspections of pump units. $\frac{50 \text{ units}}{2 \text{ years}} = 25$ units/year Assume inspection rate of two units per day to schedule, inpect, and report findings. $\frac{25 \text{ units}}{2} = 13$ days/year	13 (1)
System Maintenance (continued)		Treatment and Disposal Systems Routine visits, at least twice a week per system (there are two systems). Assume 1 day/week for routine visits and inspections.	52 (1)
System Repair/ Rehabilitation Failed system inspections Repair supervision Violation notices	County health department will regulate septic system repairs with sewer authority coordination and supervision of installation.	On-Site Systems Six failed systems/year. Each system investigation and follow-up will take one day.	6 (1)
		Cluster System Failing pump units and other equipment are taken care of as part of routine maintenance activities.	

TABLE 10. (CONTINUED)

Management Activity Description	Implementing Agency	Calculations and Assumptions	Annual Workday Requirement by Staff Type
Residuals Disposal Septage pumping Septage disposal	Private haulers contracted by property owners for individual systems and STEP units. Sewer authority to contract haulers for cluster system (holding tank). Sewer authority to administer and manifest system for private haulers.	Direct manpower limited to manifest system administration. Private haulers to pump holding tanks. Assume cluster system treatment units to be pumped once every year at $100/event; therefore, annual cost of $100 for septage pumping for the cluster unit (see Table 11).	15 (1)
Monitoring Surface-water quality Groundwater quality Special systems monitoring	Sewer authority will sample water quality and state agency will analyze samples taken.	Quarterly sampling at 12 sampling points. Assume 1 day/quarter to sample.	4 (1)
Administration Financial management Office administration Special consulting Compliance reporting	Sewer authority will employ part-time administrator for at least first 2 to 3 years of of operation. Part-time clerical assistance is also necessary.	Assume 0.5 day/week for manager. Assume clerical assistance at two days/week.	26 (2) 104 (3)

Total Workday Requirements:

(1) Technician/inspector - 139 workdays/year
(2) Program administrator - 26 workdays/year
(3) Clerical - 104 workdays/year
Total Workdays/Year - 269 (This represents slightly more than one work-year of effort)

TABLE 11. CALCULATION OF OPERATING COSTS (EASTTOWN AND WESTTOWN SEWER AUTHORITY)

Labor Items	Average Annual[1] Salary	Adjusted[2] Salary
Program manager	$15,000	$ 1,500
Assistant manager		
Professional staff		
Field crews, technicians, operators	10,000	5,350
Clerical/bookkeeping staff	7,500	3,000
Total salary costs (from column 2)		9,850
Insurance and benefits (at 20% of total salary costs)		1,970
Total Labor Costs		$11,820
Nonlabor Items		
Treatment system utilities, chemicals, etc.		
Vehicle financing	2,000	
Vehicle maintenance	1,000	
Miscellaneous equipment, tools, etc.	400	
Replacement parts, etc.	500	
Treatment service charges		
Residuals disposal charges	100	
Septage hauling costs		
Private contractor service charge		
Testing equipment		
Laboratory analysis	500	
Office expenses (rent, postage, supplies, utilities, etc.)	3,000	
Staff training		
Training courses, seminars, etc.	300	
Consultant services		
Legal/accountant services	1,000	
Taxes	500	
Insurance (on equipment)	500	
Miscellaneous expenses (e.g., mileage)	500	
Total Nonlabor Costs		$10,300
Total Operating Costs (labor plus nonlabor costs)		$22,120

---

[1] Total annual salaries for program staff personnel.

[2] Adjusted annual salaries based according to portion of work-year effort devoted to the program (from Table 10).

imposes costs on almost a house-by-house basis, which recognizes the different operation and maintenance needs of wastewater systems and different property owner attitudes toward system care and maintenance within a service area. While satisfying household equity issues, administering a variable rate system could become complicated. The major criteria to be applied in evaluating a specific financing arrangement include:

1. Ease of administration.
2. Equitability of cost sharing among users (i.e., incidence or burden of costs on users).
3. User ability to pay.
4. Effectiveness in raising sufficient revenue.
5. Secondary impacts (e.g., on sewer extension notices, or on household attitudes toward system maintenance).

In the Easttown/Westtown example, the following cost allocation issues were of primary concern to the local officials and general public:

1. The allocation of costs between:
   a. Existing and future residents.
   b. Households on the cluster system and households with on-site systems.
   c. Households with fixed incomes and active-income producing households.
2. The distribution of costs between the two towns. (Should they be shared equally or apportioned by town?)
3. The cost-sharing arrangements made between households with failing on-site systems and households whose systems were functioning properly.

These issues reflect the real concerns of service area residents during the facility planning process, i.e., the allocation of costs of program management and facility operation so that users pay according to benefits received. These major cost concerns are addressed in Table 12, which illustrates the cost allocation method chosen for the towns.

TABLE 12. ON-SITE/CLUSTER SYSTEM FINANCING ARRANGEMENT ASSUMPTIONS

Major Cost Items	Proposed Financing Method	Alternative Methods Considered
Financing local share of initial capital costs	Initial assessment to property owners who have had their septic systems upgraded or have connected to the cluster system; supplemented with a revenue bond to cover the remaining costs.	Use of loans, bonds, property taxes and other debt financing techniques which spread these costs over a larger base, and over a number of years (i.e., no initial assessments).
Financing of future septic system rehabilitation and STEP system pump replacement	Creation of a reserve fund, financed by all users. An initial assessment would also be levied toward all users whose systems failed. (User would be charged for pump replacement only in cases of user negligence or misuse.)	These costs could be paid for by the property owner when the system needs replacement or major repair is required.
Annual operating costs	Included as part of the user charge levied to all households. Includes all costs for inspections, service calls, installation supervision, and program management. Includes a fee for maintenance permit renewal.	Can be charged on a service fee basis reflecting the need for providing these services. Service fee could be paid to the management agency (i.e., sewer authority) or to the private firm or other entity actually performing the service. Operating costs can be raised through property taxes or other special assessments.
Permits	Permits for system repair/replacement and for new installations are paid for separately and directly to the state regulatory agency.	Can be included as part of a user charge.
Septage pumping	Not included in the user charge. Property owners with septic systems and STEP systems would pay private haulers directly for septage pumping and disposal as determined through the inspections.	Septage pumping and disposal fee can be prorated and added to the user charge. Sewer authority could could also purchase a septage truck and maintain a crew to operate it.
House connections to the STEP unit	Financed by the property owner.	Could be done through a connection fee if management agency hooked up the system to the home.
Future septic system installations (new systems)	Built and paid for by the property owner.	No other alternative was considered.
Electrical power for STEP units	Paid for by the STEP unit property owner as part of his/her monthly electric bill.	Power costs could be paid directly by the sewer authority, with revenue raised through a special assessment or service fee.

As shown in Table 13 the local share of Easttown/Westtown capital costs would be raised through assessments of property owners whose on-site systems were upgraded or who connected to a cluster system. A reserve fund would be established (via sinking fund mechanism) to raise sufficient revenues for future on-site system and pump replacement. All users in the service area would contribute to the reserve fund, thereby assuring a source of funds to support any rehabilitation or replacement which might occur in any given year. The cost of house connections to the STEP unit (for cluster system residents), and septage disposal and permit fees are not included in the user charge. They are paid for separately by the property owner.

Translating these cost-sharing assumptions into estimates of actual user charges for the Easttown and Westtown on-site/cluster system is the purpose of Table 13.

The information presented in this table identifies the three major components of the proposed charge system:

1. Local share of initial capital investment.

2. Future rehabilitation and replacement of pumps and septic systems.

3. Operating costs of the program.

With an initial assessment of $500 for households connecting to the cluster system or having their septic systems upgraded, (in this example), the user charge per household is $146 per year. Septage disposal costs would be paid separately by each property owner (at approximately $50 per event). The costs of permits, power, and connections are also not included in the user charge fee. It was also proposed that the towns adopt the same user charge schedule. Each town, however, can develop its own system to collect user charges from residents within its town.

With the completion of the financial plan an implementation plan can be developed.

TABLE 13. ESTIMATED USER CHARGES FOR EASTTOWN/WESTTOWN ON-SITE/CLUSTER SYSTEM (1980 $)

	Cost Components	Net Annual Cost (after grants) $	Annual Cost Per User $
1.	Initial capital investment	17,400	39
2.	Future system rehabilitation/ pump replacement	26,000	58
3.	Operating cost	22,120	49
	Total	$65,520	$146

Notes:

1. Calculated debt service using a revenue bond at 7 percent over 30 years for local share of the initial capital costs less initial improvement assessment of $500/unit assessed toward households connecting to STEP collection systems or requiring initial septic system upgrading.

2. Calculated as a reserve fund (via sinking fund mechanism) at 7 percent over 20 years. Amount financed is future value of replacements and rehabilitations less future improvement assessment of $500/unit levied against housing requiring on-site system rehabilitation.

3. Total annual operating costs from Table 11.

Step 4: Implementation plan.

Using the extensive analysis performed on system costs, program operational requirements, technical feasibility, and reliability during the preparation of a Step 1 facilities plan, sufficient information should be available to develop an implementation plan.

An implementation plan outlines the actions that need to be taken in carrying out the recommended management plan. The implementation plan basically develops the framework from which a management program can evolve. Specific elements of an implementation plan include:

1. Summary of agency roles, responsibilities, and funding sources.
2. Description of the mechanism for plan implementation and a schedule for completion.
3. Development of procedures for providing short- and long-term program evaluation.

A timetable for implementation of the Easttown-Westtown sewerage project is presented as Figure 7. Some of the major activities that need to be addressed in the implementation plan and carried out prior to system construction (i.e., the implementation phase) are identified in this example. The specific actions recommended in the Easttown-Westtown implementation plan example include:

1. Create the sewer authority.
2. Obtain the authorization to proceed into Steps 2/3 of the construction grant process and prepare an application for an EPA Step 2/3 grant. Applications for the grants and loans from other agencies would also be prepared and submitted. (The EPA grant application can be made on behalf of the newly created management authority or by one of the towns, representing the two-town study area. Specific requirements of other Federal agencies and state agencies regarding the creation of a new agency should be investigated.)

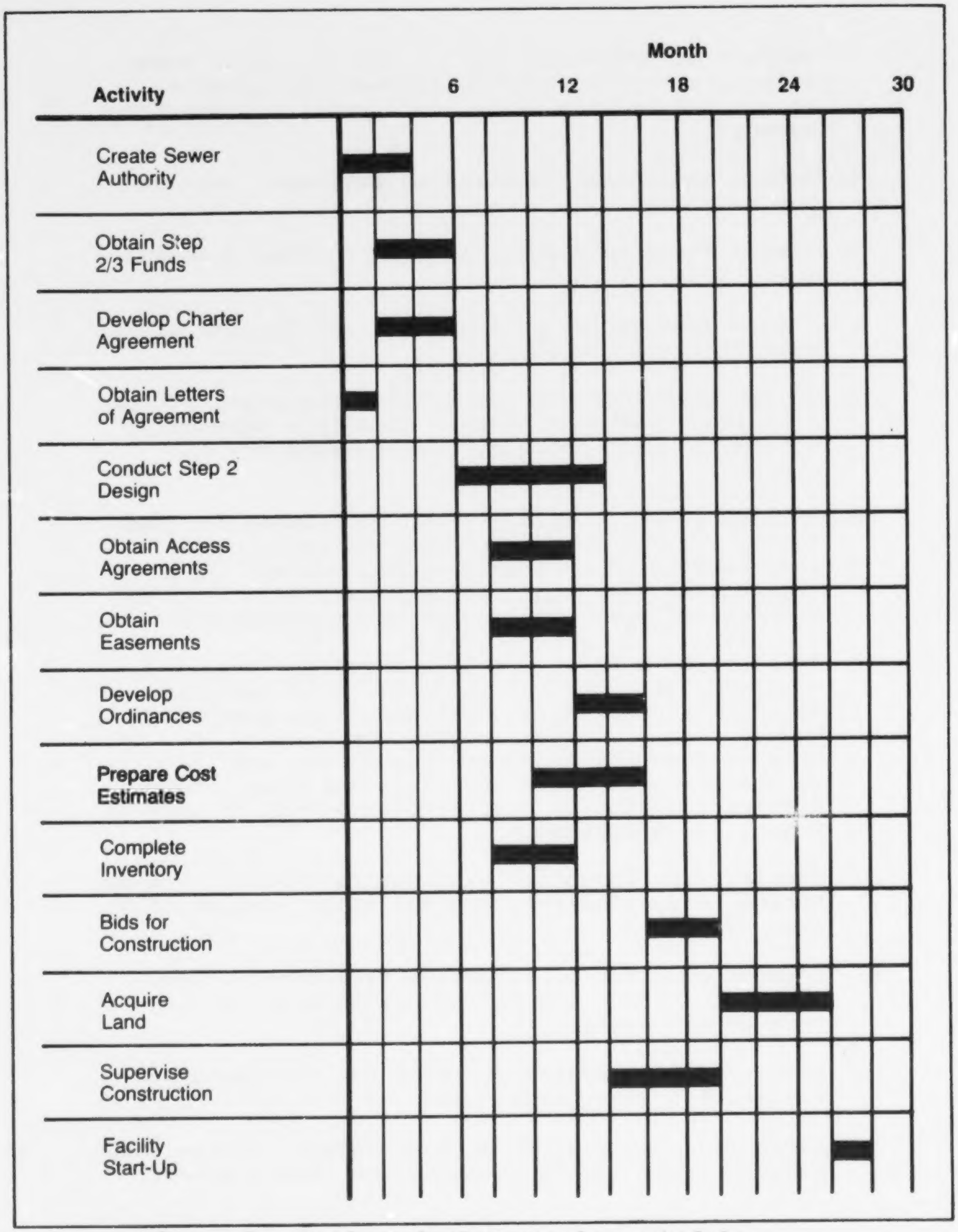


Figure 7. Project implementation schedule.

3. Prepare an operating charter for the joint sewer authority with reviews by appropriate agencies (e.g., EPA and the state environmental protection agency).

4. Obtain appropriate letters of agreement between the two towns.

5. Hire a consultant and initiate the Step 2 design activities.

6. Secure options for purchase of land for the treatment-disposal facility.

7. Obtain rights-of-way (easements) for sewer collection lines and STEP units. Formulate service agreements with property owners using on-site systems.

8. Develop a set of criteria and procedures for the design and maintenance of new and replacement on-site systems. Prepare ordinances and other regulations that might be necessary (e.g., establishment of a maintenance permit requirement).

9. Prepare (as a result of Step 2 design) detailed cost estimates for the project. Hold meetings with state and Federal agencies, town governing bodies, and the general public to present the updated cost estimates and report any modifications to the operation plan and financial plan. Hold a special election to reaffirm the intent to move to Step 3, construction.

10. Complete the inventory of existing on-site systems noting size, location, and operating history of each system.

11. Request bids for construction from contractors. Make a selection and begin work to install the recommended system.

12. Acquire all necessary property for treatment facilities, sewer lines, etc.

13. Supervise construction of the project, review, and authorize any modification to the design plans.

14. Begin operation of the cluster system. (Operation of the on-site system management activities can start earlier, however.)

In the illustrative case presented in this chapter, a wastewater system engineer from a nearby community sewer utility was hired on a part-time basis to serve as the authority's wastewater program manager. This individual helped the towns establish the implementation plan and enter into the final phases of program management; implementation phase and facility start-up phase. It is in these later steps of management program development where elements of the wastewater management plan are actually carried out.

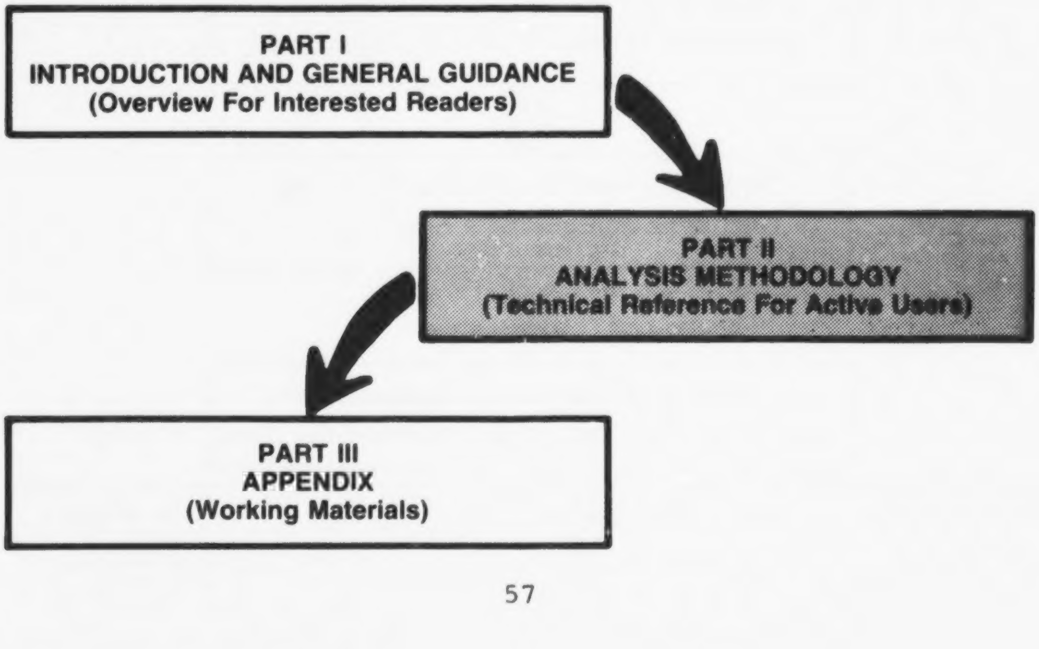
As mentioned at the outset of this chapter, the remaining text provides more specific guidance in developing institutional arrangements for initiation and planning phase activities.

PART II: ANALYSIS METHODOLOGY

Chapter 3: Selection of the Management Agency
Chapter 4: Formulating an Operations Plan
Chapter 5: Formulating a Financial Plan
Chapter 6: Formulating an Implementation Plan

This part of the document is a technical reference which provides a detailed methodology for evaluating and selecting institutional components of wastewater management programs. The emphasis in the section is to describe and evaluate institutional options for implementing management functions. It should be used by persons actually involved in assessing institutional arrangements and developing management programs.

Each chapter begins with a user's guide which presents the analysis steps in the methodology. The user's guide is accompanied in each chapter by sections addressing institutional options for performing various management activities. Case study experiences are included to illustrate and further define the institutional options.


PART I
INTRODUCTION AND GENERAL GUIDANCE
(Overview For Interested Readers)
PART II
ANALYSIS METHODOLOGY
(Technical Reference For Active Users)
PART III
APPENDIX
(Working Materials)

METHODOLOGY OVERVIEW

The institutional components of a wastewater management plan are derived through analysis of technical, economic, legal, and political factors. The principal institutional components of the wastewater management plan that will be derived through the use of the methodology are:

- Operations Plan
- Financial Plan
- Implementation Plan

The following figure provides a schematic diagram of the analysis approach to developing the three institutional components of a management plan.

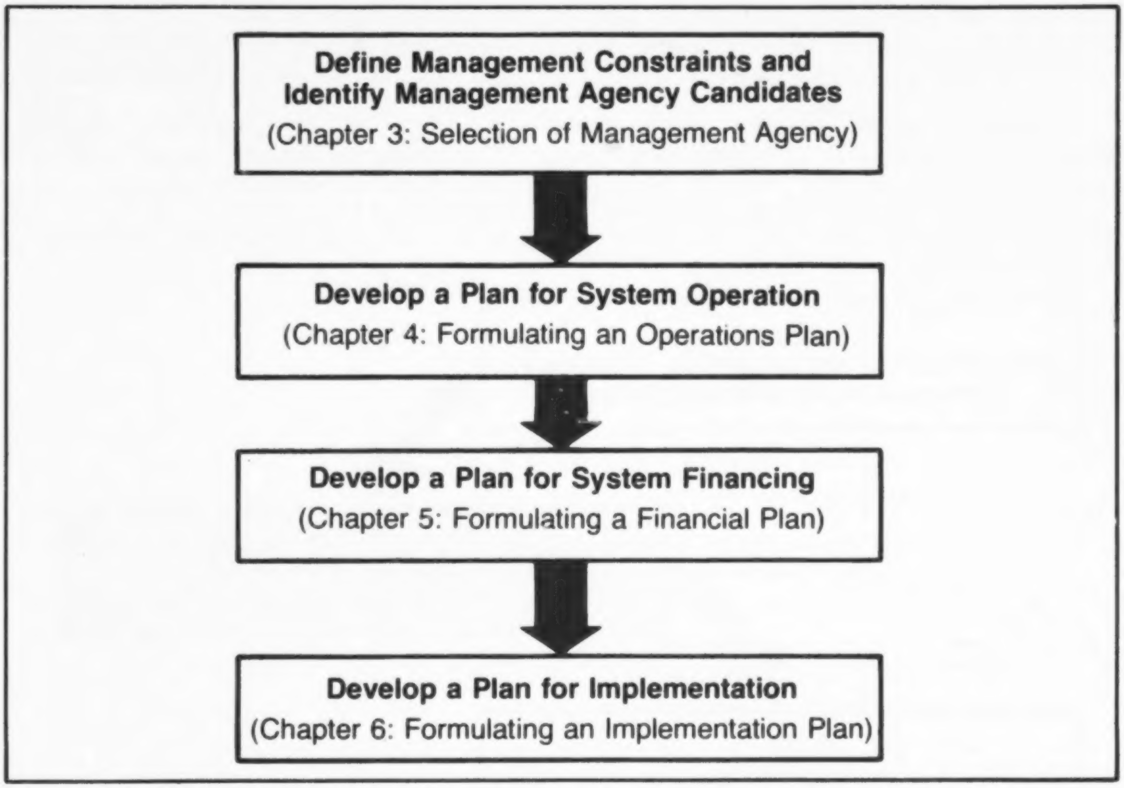

Define Management Constraints and Identify Management Agency Candidates
(Chapter 3: Selection of Management Agency)
Develop a Plan for System Operation
(Chapter 4: Formulating an Operations Plan)
Develop a Plan for System Financing
(Chapter 5: Formulating a Financial Plan)
Develop a Plan for Implementation
(Chapter 6: Formulating an Implementation Plan)

Figure 8. Management program development planning steps.

CHAPTER 3

SELECTION OF THE MANAGEMENT AGENCY

The success or failure of a wastewater management program will largely depend on the choice of a management agency. The agency or agencies selected must have the institutional capability to carry out necessary management functions, the legal authority to enforce appropriate regulations, and the financial resources to support the program. This chapter discusses factors that must be considered in identifying legal, political, and economic constraints to management, and in evaluating institutional options. It introduces the various institutional arrangements that can be applied singly or collectively to manage a small wastewater facility. Subsequent chapters (Chapters 4, 5, and 6) will utilize the results of this preliminary institutional analysis to describe how the elements of a wastewater plan can be constructed.

GUIDE FOR MANAGEMENT AGENCY SELECTION

The process of selecting a management agency should be coordinated with the development of technical or engineering solutions. The evaluation of technical and institutional considerations is a parallel process, having numerous interactions. The selection of a management agency begins with an assessment of management needs. This involves defining specific functions necessary to support the operation of wastewater treatment and disposal systems, and then identifying institutional entities which have the statutory authority and resources to carry out those functions.

The basic steps in selecting a management agency are:

Step 1 -- Define the capabilities and authorities required by a management agency.

Step 2 -- Identify potential management agencies and contact appropriate public and private representatives.

Step 3 -- Evaluate the authority and capabilities of existing and potential agencies.

Step 4 -- Select candidate agencies.

Step 1: Define the capabilities and authorities required by a management agency.

This initial step basically determines what the community wants and needs in the way of small wastewater systems management. The powers and authorities of organizations and the scope of responsibilities to effectively manage small wastewater systems should be defined at this time. These analysis decisions require that the community develop goals for land use growth and development, water quality protection, and wastewater system performance. The integration of these community goals will serve as a framework for developing a strategy for wastewater system management, upon which subsequent institutional and technical decisions will be based. Tables 14 and 15 provide the necessary information to develop a communitywide wastewater management strategy.

Table 14 summarizes the range of capabilities and powers a management agency can possess. The extent to which specific powers and capabilities must be satisfied will depend on the scope of a particular management program. (Statutory requirements for establishing a management agency are included in the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500), Section 208(b) and (c), and the Code of Federal Regulations, 40 CFR 131.11(n) and (o).)

Table 15 lists various dimensions of a management program which will help to define the scope of management responsibilities. The parameters embodied within the dimensions of a program, e.g., purpose, structure, authority, etc., are the basic characteristics that every management agency should possess, and are the fundamental units (i.e., building blocks) in formulating alternative management approaches.

Step 2: Identify potential management agencies and contact appropriate public and private representatives.

The purpose of this task is to identify potential management agencies, authorized by state legislation, which can fulfill desired management functions, capabilities, and powers. Contact should be made with existing agencies and related private interests which may also participate in developing and (eventually) implementing the institutional plan.

State legislation defines the powers and capabilities of various governmental entities (i.e., institutions) in performing wastewater management-related functions. State governments commonly delegate the authority to perform certain functions (including wastewater management functions) to regional/local entities (regional agencies, counties, cities, towns, etc.). At this point in the planning process, it is necessary to identify which governmental entities and private interests can generally provide the required management functions. Institutions to be considered as potential management agencies include, but are not necessarily limited to, the following types of entities:

1. State agencies.
2. County government.
3. Municipalities.
4. Regional planning agencies.
5. Special purpose groups.
6. Nonprofit organizations.
7. Private enterprise.

Relevant private and public interests (listed in Table 16) should be contacted and asked to become involved in the planning process. Their participation will help to better define their capability and willingness to provide management functions, and at the same time ensure effective plan implementation.

Step 3: Evaluate the authority and capabilities of existing and potential agencies.

The assessment of institutional capability should include the evaluation of the legal basis, statutory authority, and functional capability of existing institutions, as well as the administrative and political feasibility of creating new agencies. Local attitudes toward governmental intervention, ownership of the wastewater system, local autonomy, availability of grant assistance, program accountability, and consistency with other plans, policies, and area objectives should also be considered in selecting the appropriate institutional arrangements to fulfill required management program functions. Many of these concerns are summarized in Tables 17 and 18 to serve as a guide for conducting institutional analyses. (Subsequent assessments of institutional and financial aspects of system operation and financing are oriented toward providing the information listed in these tables.)

Pertinent characteristics of institutions available for wastewater management should first be listed for comparison, as shown in Table 17. Table 18 represents a matrix of the managing powers provided in the statutes (either expressly or implicitly. Tables 17 and 18 are suggested formats for presentation purposes; the user should review these displays and modify them according to specific needs.

Step 4: Select candidate management agencies.

The selection of the management agency, its responsibilities, and supporting agencies and interests will be conducted in concert with most of the technical analysis, and primarily through preparation of the operation, financial, and implementation plans. Throughout the entire process of management plan development, the evaluation criteria set forth in Table 19 should be used to assure:

1. That the institutional arrangements can be implemented.

2. That these arrangements will be effective in carrying out the prescribed management functions.

3. That the costs incurred in the program are not a burden to any single group.

These evaluation criteria can also be used early in the planning process to screen potential management agencies. Those agencies that receive poor ratings in this initial screening should be eliminated from further consideration. The potential capability and willingness of agencies to accept management responsibilities will be more specifically evaluated in developing the operational, financial, and implementation elements of the management plan.

Table 20 suggests a presentation format for assessing capabilities of alternative management agencies. This presentation can be used to evaluate legal, administrative, and economic factors associated with candidate management agencies.

The next section in this chapter, "Institutional Options," presents a more thorough discussion of possible management agencies and their roles in fulfilling general management functions.

TABLE 14. POWERS AND AUTHORITIES OF MANAGEMENT ORGANIZATIONS

- The power to issue and enforce regulations.
- The authority to own and operate wastewater facilities.
- The right of access to private property to inspect systems and correct malfunctions.
- The ability to raise revenues by setting and collecting user charges and fees, and levying assessments and taxes on benefited properties.
- The authority to acquire by purchase, grant, and/or lease, both real and personal property.
- The power to declare and abate nuisances, to require and recommend correction procedures, and to perform corrections and bill the property owner if he fails to repair the system.
- The authority to plan and control how and when wastewater services will be provided within the community.
- The ability to receive state and Federal grants to build wastewater facilities, to incur debt obligations by borrowing or issuing bonds, and to sue and be sued.
- The ability to contract and delegate responsibilities to qualified persons or firms for the performance of any or all management functions.
- The ability to license, train, or certify persons involved in system design, installation, maintenance, and residuals disposal.

TABLE 15. MANAGEMENT DIMENSIONS

Time Frame

- Will the management program be a permanent solution or an interim measure?
- Where in the process of plan development and program formulation is the user situated?

Size

- What is the geographic size of the area to be served?
- Is it compatible with a local public jurisdiction?
- Is sufficient manpower available within an institutional structure to service the area under study?
- Does service area size affect the type of institution required to manage the wastewater systems?

Purpose

- Should the management program be limited to wastewater management or should other utilities be included (e.g., water supply)?
- What is the range of functions to be provided (i.e., coverage of all necessary management functions or only the required minimum functions)?

Structure

- Can new agencies be created to provide management functions on a localized basis or can existing ones be modified?
- How will the agency be staffed; full-time employees, part-time employees, volunteers, or by contract with a private firm?
- What will be the organizational relationship between the management agency and the participating municipalities?

Authority/Liability

- Will the wastewater systems be publicly or privately owned?
- How will the wastewater systems be operated and maintained?
- Who will bear the costs of future system repairs and replacements?
- Will existing regulatory entities continue to exercise regulatory authority over wastewater system design and maintenance or will new regulatory entities be created?
- How will the necessity of replacing an existing on-site system be determined?
- Will both existing and new on-site systems be included in the management program or only new systems?
- What is the extent of authority to be provided; advisory, managerial, or regulatory?

Staging

- How will future system extensions be determined?
- When is public agency intervention in the planning process and program formulation process required?

Agreements

- Does adequate legal authority exist?
- Do new or modified interagency arrangements, legislation or ordinances need to be established?
- Do agreements with property owners need to be acquired?

TABLE 16. AGENCIES AND GROUPS THAT MAY PARTICIPATE IN MANAGEMENT PLAN DEVELOPMENT

Federal Agencies

- Environmental Protection Agency (EPA)
- Farmers Home Administration (FmHA)
- Department of Housing and Urban Development (HUD)
- Economic Development Administration (EDA)

State Agencies

- Health departments
- Environmental protection agencies

Regional/Local Agencies

- Regional, county, and municipal government agencies (planning, health, engineering, public works, etc.)
- Sewer and water authorities, utilities, or districts
- Soil and water conservation districts
- Association of local governments.

Private Interests

- Professionals (engineers, planners, lawyers, bondsmen, soil scientists, etc.)
- Contractors (septic system installers and septage haulers)
- Local home builders associations
- Organized private interest groups (homeowner associations, nonprofit organizations, and other environmental groups)

TABLE 17. PERTINENT CHARACTERISTICS OF INSTITUTIONS AVAILABLE FOR WASTEWATER MANAGEMENT

Institution[1]	Applicable Statute Citation	Jurisdiction - Service Area	Formation	Governing Body	Operational Status[2]

SAMPLE FORMAT

---

[1] List appropriate agencies and institutions identified earlier in this column.

[2] Identify whether the agency is an existing operating entity or if a similar entity has been established elsewhere in the region or state.

TABLE 18. MANAGEMENT REQUIREMENTS ASSESSMENT MATRIX

Management Requirements	Institutions[1]						
	County[2]			Township			• • •
	Yes	No	Partial	Yes	No	Partial	
Administrative Requirements							
• System ownership capability							
• Enter contracts							
• Acquire property							
• Sue or be sued							
Regulatory Requirements							
• Set rules and standards for system design and operation							
• Enforce rules and regulations							
• License private contractors							
• Require connection to facility or participation in management program				SAMPLE FORMAT			
• Enforce system repairs							
Operation and Maintenance (O&M) Requirements							
• Access to private property							
• Establish O&M procedures							
• Perform periodic inspections							
• Perform maintenance							
• Compliance monitoring							
Financing Requirements							
• Set user charges and fees							
• Collect user charges and fees							
• Accept grants							
• Incur debt							
• Issue revenue bonds							
• Issue general obligation bonds							
• Require performance bonds							
• Assess property taxes							
• Levy special assessments							
• Establish reserve funds							
Comments[3]							

---

[1] List the institutions identified earlier across the top of the matrix.

[2] Indicate legal authority to provide management requirements for each identified institution.

[3] Subjective comments on all of the above factors and any others which may affect the choice of management agency.

TABLE 19. EVALUATION CRITERIA FOR SELECTION OF MANAGEMENT AGENCIES

Political and Public Acceptability

- Does the agency authority enable it to coordinate with other management agencies through administrative, regulatory, or policy channels? Have sufficient coordinative mechanisms been provided?
- Does the agency provide for public participation through representation on decision-making boards, through public hearings or meetings, through participation with professional or organized societies, or through public disclosure?
- Is the agency accountable to publicly-elected officials, and to the affected area residents?
- Does the approach maintain local autonomy, or does it shift responsibilities to higher levels of government?
- Is the program responsive to other areawide goals and objectives? Is it compatible with the objectives and capabilities of operating agencies within the area?
- Is there sufficient legal authority to implement program elements? Is existing enabling authority vague or uncertain as to its applicability to on-site or small community systems management?

Institutional Feasibility

- Are existing institutions used to the fullest extent? Are adequate enforcement powers available?
- Does the program call for extensive changes to the current institutional structure?
- Are extensive legislative changes required?
- Has the track record of the agency supported its ability to organize an efficient and effective management program?

Administrative Efficiency

- Does the management program have the potential for voluntary compliance?
- Are the administrative procedures cumbersome or complex?
- Does the agency jurisdiction correspond to the geographic boundaries of the problem?
- Does the agency have the technical expertise for providing management functions?
  - Can the agency contract directly to obtain professional assistance?
  - Does the agency have specific staff positions with competitive salary structures for needed technical expertise?
  - Are technical manpower support services available in the existing labor market?
- Are the agency's staff resources overloaded with other assignments?

Economic Equity

- Is the program economically equitable? Is the incidence of user costs a burden to any one group (rural or urban, population groups, between municipalities)?
- Is the program economically efficient? Does it take full advantage of economies of scale, elimination of duplicate services and unnecessary permit delays, balancing of structural and nonstructural controls?
- Does it cause substantive changes in the land use or neighborhood character of the area (i.e., secondary socioeconomic effects)?
- What are the financial impacts on each participating community?

TABLE 20. MANAGEMENT AGENCY RANKING MATRIX

Evaluation Criteria	Management Agency Alternatives				Comments
	1	2	3	4	
Political and Public Acceptability					
• Coordinative capacity					
• Public acceptability					
• Public accountability					
• Local authority					
• Responsiveness to areawide goals					
• Legal authority					
Institutional Feasibility					
• Use of existing agencies					
• Institutional changes					
• Legislative changes					
• Past record of management agency					
Administrative Efficiency					
• Potential for voluntary compliance					
• Efficient administrative procedures					
• Service area jurisdiction					
• Technical expertise					
• Agency staffing					
Economic Equity					
• Incidence of costs					
• Economic efficiency					
• Impact on land use					
• Financial impacts					

SAMPLE FORMAT

Legend:

+	Positive impact
0	No impact
-	Negative impact

INSTITUTIONAL OPTIONS

As noted in the previous discussion, there are several institutional options for designating a management agency. This section contains a description of the various types of institutions that can assume management responsibilities. The intent here is to develop a understanding of the structure and potential authority various entities can assume. The public and private organizations that participate in small wastewater management include:

1. Federal agencies.
2. State agencies.
3. Local public entities
    a. Counties.
    b. Incorporated municipalities (cities, towns, villages, etc.).
    c. Sanitary or utility districts (special purpose agencies, public authorities).
4. Nonprofit institutions.
5. Private firms.

These entities have a broad role to play in the planning, administration, regulation, financing, and operation of wastewater programs. Several Federal agencies offer financial and technical assistance to state and local management efforts. States are responsible for the administration of funding, regulatory and technical assistance programs for local governments. Local public bodies and private entities are responsible for planning and operating wastewater facilities and enforcing applicable regulations.

The precise roles and responsibilities these entities will assume in a wastewater program will depend on the preference, capabilities, and circumstances found in a given community situation. Due to the variation in state enabling legislation and organizational structure, the form, jurisdiction, and authority of local public entities to manage small wastewater systems varies from state-to-state.

Each of the alternative organizations is described in the subsections that follow. Table 21 displays several generic characteristics of state, local, and private entities. This information is presented in a manner which enables the comparison of attributes and capabilities among these institutional alternatives.

Federal Agencies

Federal agencies, particularly the Environmental Protection Agency (EPA), Farmers Home Administration (FmHA), and the Department of Housing and Urban Development (HUD) offer technical assistance and funding to states and local governments for implementing wastewater management projects. The availability of funds and staff from these agencies to provide assistance changes frequently. Persons involved in the wastewater management planning process should investigate all potential sources of Federal funds and technical assistance by contacting regional and national representatives of these agencies, or by consulting the Federal Assistance Program Retrieval System (FAPRS) through the Office of Management and Budget (OMB). Inquiries regarding this system may be directed to OMB in Washington, DC or the Agricultural Extension Service located at state land grant colleges.

State Agencies

State involvement in implementing on-site and small community wastewater management programs to a large extent parallels that of the Federal government by promulgating and enforcing regulations, and providing financial and technical assistance to individual communities. State agencies offer technical assistance in evaluating and designing wastewater systems; administer financing programs to build new systems and replace failing systems; set and enforce standards for system design, installation, and maintenance; and conduct research on system performance. Each state is organizationally different in regulating small wastewater systems, and in offering technical assistance and financing of these systems.

TABLE 21. WASTEWATER MANAGEMENT CAPABILITIES

	State Agency	County	Municipality
Description	State agencies such as environmental protection agencies, health departments, and public utility commissions are involved in wastewater management activities.	A county is the most basic political subdivision within a state. It is generally made up of incorporated (municipalities) and unincorporated areas.	Municipalities are cities, towns, villages, and townships.
Service Area	State agency program enforcement can be handled on a substate (regional) basis.	A county can provide services throughout its jurisdiction, or to defined areas via improvement districts.	A municipality can provide services throughout its jurisdiction or to defined areas via improvement districts.
Governing Body	State legislature is principal governing body. State agencies can report directly to the governor, legislature, or to an autonomous board of directors.	Depending on the state statutes, county population, and other local circumstances, county governments can take several forms: commission, council-administrator, or council-elected executive. The elected county board in each of the three forms of government is the principal legislative branch of government.	There is great diversity in municipal organizational structure. Basic forms of municipal government include mayor-council, commission, and council-manager. The council or commission is usually an elected body with primary decision-making authority.
Responsibilities	Many states are directly involved in code enforcement of on-site and small community wastewater design, installation, and operation standards. States also provide special technical and financial assistance to small communities.	Counties serve as coordinators of municipalities in its jurisdiction. They can provide special services to municipalities on a contract basis. They can serve as a fiscal agent for the other local units of government.	Municipalities provide a wide range of services.
Financing Capabilities	Broad-based financial support to programs is possible through Federal grants and state general revenues. States will assume a major role in administering the construction grants program.	A county can fix charges for sewerage sources and finance facility construction from taxation, general funds, special assessments, general obligation bonds, revenue bonds, and permit fees. Improvement districts can be used as the primary mechanism of raising revenues for wastewater management services.	Municipalities are vested with a broad range of fiscal powers to finance public improvements (similar to counties).
Advantages	States have financial and regulatory advantages over local governments, and are more aware of local needs than Federal agencies. States can effectively coordinate wastewater management activities administered by substate entities. State enforcement of codes can provide insulation from local political pressures. Through more specialized staffing capabilities, states can administer training and certification programs for persons involved in wastewater management activities.	Counties are in an advantageous geographical position to interact with states and local governments on many issues. Counties are sometimes looked upon as administrative arms of state government. Counties provide an efficient resource base for providing public services.	Municipalities can better react to local perceptions and attitudes.
Disadvantages	Each state is organized differently with respect to small wastewater system programs; the experiences of one state are sometimes difficult to implement in another. States may become too distant from local needs unless regional offices or a specific state agency group specializing in small wastewater systems activities is established.	County governments are sometimes not willing to become involved in providing specialized public services to a defined service area. Local governments are sometimes also unwilling to allow county government to provide services for them, unless the localities are assured some role in the decision-making process. Community debt ceilings could restrict the use of general obligation bonds.	Small towns and villages may not have the administrative capability, staff, or willingness to operate small wastewater facilities or regulate system design and installation. Financing opportunities may be limited by small resource base or municipal debt limits.

TABLE 21. (CONTINUED)

	Special District	Improvement District	Public Authority
Description	Special districts are quasi-municipal entities having a wide range of functions prescribed by state enabling legislation. Special districts can provide single or multiple services.	A device used by counties or municipalities to provide services to a part of the local government jurisdiction.	A special purpose type of government or corporation, authorized to administer a revenue-producing public enterprise (e.g., water and sewerage services). This type of organization is similar in concept to a special district.
Service Area	The territory served by a special district is flexible.	Usually part of a single jurisdiction. Can have several improvement districts within a single jurisdiction.	A public authority's jurisdiction of coverage is flexible; it can be comprised of a municipality, group of municipalities, county, or group of counties.
Governing Body	The governing body of a special district is a board of directors who can be: • Elected by voters in the service area. • Appointed by a government agency. • Composed of members of a government agency.	The governing body of the creating unit of government is the governing body of the improvement district.	The governing body of a public authority is a board of directors. The board members can be: • Elected by residents within the service area. • Made up of members of the governing body of the local government.
Responsibilities	Special districts can perform all wastewater management functions, similar to a local governmental entity. State enabling legislation defines the function and scope of special districts.	State statutes define the extent of authority of improvement districts. Their authority is usually applied to finance public service improvements.	A public authority can provide a wide range of functions. It is used predominantly for its financing capabilities.
Financing Capabilities	Special districts can use local taxation, special assessments, service charges, grants, loans, general obligation bonds, and revenue bonds to finance projects. Special districts are sometimes created to circumvent financial restrictions placed on local governments.	Can apply special property assessments, user charges, and other fees, and sell bonds to finance improvements. The principal use of this mechanism is to assess property owners for benefits received. Shares similar financing capabilities as counties and municipalities.	Its revenue-raising capability is limited to revenue bonds, user charges, and connection fees.
Advantages	A special district is a flexible method of providing wastewater services. There is equity of services rendered; only those persons receiving services pay for them. Special districts are simple, independent forms of government that can provide specialized services.	Ability to extend public services without major expenditure of public funds. Persons within the benefitted area usually favor the improvement.	Public authorities are useful where local governments cannot provide public services because of financial, administrative, or political problems. A public authority has a certain degree of autonomy and independence from municipal budgetary and administrative controls.
Disadvantages	Special districts can promote a proliferation of local government and duplication and fragmentation of public services. Fiscal problems could result from overextended use of special districts. Some problems with accountability to service area residents may result.	Contributes to fragmentation of local government services. There can be significant administrative delays in establishing the district.	A public authority cannot tax property; its financing ability is limited to revenue bonds. Therefore, it is difficult to assure that debt obligations can be met without a certain degree of local government support. Public authorities are frequently criticized for lack of public accountability and a self-serving nature (largely due to their dependence on revenue bond financing). The marketability of revenue bonds depends on the confidence of the bond market.

TABLE 21. (CONTINUED)

	Public Nonprofit Corporation	Private Nonprofit Corporation	Private (For Profit) Corporation
Description	The purpose of a nonprofit corporation is to provide water or wastewater services on behalf of local governments.	A private nonprofit corporation can be established by the users of a facility to assist in facility financing and operation.	Private enterprises in the form of small private firms or private companies and utilities can design, run, operate, or maintain sewerage facilities.
Service Area	The concept is flexible; it can be applied to a single community, group of communities, or on a statewide basis.	The service area can include subdivisions, small communities, and rural areas.	The service area for a private corporation is flexible. It can range from a single homeowner to a small community. Franchise rights and licensing requirements can restrict service area boundaries.
Governing Body	The directors of the corporation are usually municipal or state officials. The governing body of the sponsoring government must approve projects and accept the corporation's assets after the indebtedness has been amortized and paid off.	The corporation is governed by a board of directors elected by stockholders or by property owners in a property owners' association. Stock can be issued to the members of the corporation at a nominal fee.	The single or sole proprietorship is the simplest form of business organization. A single proprietor (or partnership) simply invests his capital and begins to do business. A private utility or corporation has stockholders or investors as the principal supporting group.
Responsibilities	Nonprofit corporations tend to serve strictly as financing mechanisms for sewerage and water facilities. Local governments provide the necessary regulatory activities, such as acquisition of rights of way. A nonprofit corporation can also be used to provide technical assistance to small communities.	The corporation can provide financing and operational functions.	The private sector has an active and flexible role to play in managing small wastewater systems.
Financing Capabilities	Revenues are derived from user charges and service fees and sales of stocks and tax-exempt bonds. Can accept some Federal grants and loans.	Nonprofit corporations are eligible for some Federal grants and loans, and are regulated by state public utility commissions.	The state public utility commission (PUC) has jurisdiction over private companies providing sewerage services in most states. The PUC exerts a certain degree of control over the adequacy of service rates charged.
Advantages	A nonprofit corporation offers a great deal of flexibility in establishing wastewater management facilities, and financing wastewater facilities by state and local governments. Financing methods do not affect local debt limitations. Several states have already established nonprofit corporations to help finance local water and sewer projects.	This approach is promoted by the National Demonstration Water Project in rural areas as part of a self-help program for management of water and sewer facilities. It provides public services where local governments are unwilling or unable to provide them.	The participation of the private sector in various aspects of wastewater management frees the local public sector from providing these services. Competition among firms will help to ensure that adequate services are provided and reasonable prices are charged.
Disadvantages	Local governments may be reluctant to apply this concept.	The major concern by regulatory agencies is that services would be terminated, or that services would not be provided efficiently or satisfactorily. Third party arrangements can help avoid this problem.	The biggest disadvantage of this arrangement is the threat that the private entity will go out of business. Private corporations are also not eligible for most Federal and state grants and loans for wastewater projects.

States are assuming more direct responsibility in administering EPA's construction grants program. Chapter 6 discusses some of the ways state programs can assist small communities in facility planning and implementation activities.

Counties

The size, purpose, and authority of counties varies from state-to-state according to each state's statutes and laws. The role of county government in providing wastewater management services is equally diverse. A county can provide certain functions, such as on-site system regulation, within its geographical jurisdiction, or it can supplement and support existing city, town, or village wastewater management programs, with technical, financial, or administrative assistance.

Counties have at their disposal a wide range of financing mechanisms to raise revenues for small wastewater system planning, regulatory and operational activities. In offering these services, counties can simply provide the service to its constituents through its normal operational mechanisms (e.g., a county department or agency), or it can create a special district (sometimes referred to as an improvement district) to provide specialized services to a defined service area. (See also the discussion of improvement district capabilities.)

Incorporated Municipalities

Municipalities (generally including cities, towns, boroughs, and villages) are an important general-purpose unit of local governments. (Although townships are not considered incorporated municipalities in most states, they may possess authority similar to small municipalities for providing wastewater services.) As incorporated communities, municipalities operate under local charters which are either set forth or approved by state legislative action, or prepared under self-executing home rule provisions. The municipal charter and state municipal statutes generally outline the authority of these local governments in providing wastewater services. Similar to counties, municipalities provide a wide variety of services, depending on geographic size and resource base.

Special Purpose Agencies

Special purpose agencies are created to provide public services which are not provided or cannot be provided by local government. There are two different forms of special purpose agencies that can carry out wastewater management functions -- special districts and improvement districts.

A special district is an agency of government which operates outside the regular government to perform single or multiple services. The territory serviced by the district is flexible; it may consist of a single community, a part of a single community, a group of communities, or parts of several communities. State enabling legislation outlines the major governmental characteristics of the districts, such as service area function, organizational structure and financial authority, as well as set the conditions of their performance. The procedural steps required to create a special district are simple, although wide variation exists among state enabling legislation. The basic methods of forming a special district include:

1. The state legislature can pass a special act for the formation of a special district in a certain location, or generally permit such districts with given powers under specified conditions.
2. A local government (e.g., county) can create a special district by resolution of the governing body.
3. Service area property owners and residents, or service area residents (without necessarily being registered voters or property owners) can petition (usually the governing body of a public agency) to form a district. The requirement for creating the district is typically a simple majority of the votes cast.

An improvement district, on the other hand, is a mechanism used by counties and municipalities to provide public services which benefit only those residents residing within the defined service area. Public improvements, such as providing wastewater management services, are provided through the fiscal resources of benefitted properties. The governing body of an improvement district is the governing body of the local government which created it. An improvement district can be created by the local government by resolution of the governing body, at the request of the local service area residents, or on the basis of a perceived need by local decision-makers.

Public Authorities

A public authority is a corporate body, chartered by the state legislature, with powers to own, finance, construct, and operate revenue-producing public facilities. Public authorities are also referred to as commissions, public benefit corporations, municipal authorities, and sewerage authorities.

A public authority can be used in a variety of ways to construct, finance, and operate a public facility. The authority can:

1. Construct, own, operate, and finance improvements to provide public sewers to a municipality, group of municipalities, a county, or group of counties.
2. Finance and construct the public facility, and turn it over to the appropriate unit of government.
3. Offer financing for publicly-owned improvements.

Another significant feature of the public authority (in some states) is that despite considerable freedom during the operational phase, the properties of the authority can revert to the creating local government when their indebtedness is amortized and paid. There is a tendency, however, for new obligations to be incurred, and thus, termination under this provision seldom occurs.

Nonprofit Corporations

Nonprofit corporations can be classified as public or private entities; i.e.,the corporation can be formed by a state or local government (public nonprofit corporation) or a developer (private nonprofit corporation). Special districts and public authorities can generally be classified as public nonprofit corporations. The authority of this type of entity would be contained in the applicable public utility law of that particular state, and in articles of incorporation approved by member jurisdictions. The rules governing the formation and operation of nonprofit corporations vary from state-to-state, however, these corporations may be subject to state public utility commission (or public service commission) regulations.

A public nonprofit corporation can be formed by cooperating communities for the purpose of providing a public service, such as wastewater disposal or water supply. The participating communities hold stock and shareholder rights in the corporation, and the entity functions autonomously. A private nonprofit corporation can be established to perform the same functions. However, the ownership is vested with the stockholders or property owners forming the corporation. Typical private nonprofit corporations include rural cooperatives and property owners associations.

In a property owners association, it is desirable to incorporate when the land is initially developed. This facilitates the delineation of utility easements and deed restrictions which provide continuous membership in the association in the event the property is sold. This is usually accomplished by requiring membership in the association to run with the land. Typically, such convenants and utility easement locations are recorded at the time of subdivision plat approval.

Private (For Profit) Corporations

The private sector has an active role to play in the management of small wastewater systems. As noted in the preceding discussion, private nonprofit corporations, made up of property owners or community residents, can be set up to own, operate, and maintain sewerage facilities. Likewise, private enterprise, in the form of small private firms or private companies and utilities, can design, install, own, operate, or maintain sewerage facilities. Septage haulers, plumbing contractors, septic system installers, and private utilities are included in this institutional category.

Private (for profit) corporations or utilities that own, operate, and maintain sewerage facilities are regulated by a state public utility commission.

Various legal mechanisms can be used to assure continued acceptable service at reasonable rates for both private (for profit) corporations and private (nonprofit) corporations. While the Public Utility Commission does exert a certain degree of control over the adequacy of service and rates charged, other methods of protecting the consumer are usually applied to private corporations (both profit and nonprofit). Among these mechanisms are:

1. Trust deed.
2. Third party beneficiary contract.
3. Franchises from governmental authority.

A description of these mechanisms can be found in the appendix to this report (see Service Agreements, Section III-2). These mechanisms are required to ensure that private organizations will be:

1. Financially secure.
2. Provide continuous and permanent service.
3. Accountable to its customers.

Despite the potential problems with private organizations, the presence of a private utility or experienced private controller relieves the burden of providing wastewater services (such as septage disposal and facility operation) by local governments. Competition and profits will help to assure that adequate services are provided. Renewable competitive contracts or franchises will help to guarantee quality service and control costs.

Institutional Overview

The preceding discussion has outlined the roles, responsibilities, and powers of various institutional options for managing small wastewater systems. All levels of government, Federal, state, county, and local, were highlighted. In many cases it was difficult to precisely outline the powers of a particular entity because of the wide variation in enabling legislation and political organization from state-to-state. The discussion that was presented, however, serves to introduce these institutional concepts, which are applied to developing operation, financial, and implementation plans (described in the three chapters that follow).

CHAPTER 4

FORMULATING AN OPERATIONS PLAN

An operations plan defines the specific program activities to be performed by management agency personnel. This specifies what functions (pertaining to design, installation, and maintenance of small wastewater systems) will be provided, how their functions will be carried out, and by whom. Much of the information presented in Chapter 3, "Selection of the Management Agency," is applied in the formulation of an operations plan.

The institutional issues involved in preparing an operations plan include:

1. Who will promulgate and enforce system design regulations?
2. Who will conduct site evaluations, prepare system designs, review design plans, and issue permits?
3. Who will ensure that systems are installed according to design?
4. Who will inspect system operations?
5. Who will pump out and dispose of septage wastes?
6. Who confirms that a system has failed and requires its repair?
7. Who performs continuing maintenance and repair?

Complementing technical issues which need to be addressed in preparing an operations plan, which are inputs to the institutional assessment, include:

1. What types of wastewater systems are to be applied?
2. What are the limits of the service area?
3. How will site evaluations be conducted?

4. What should the inspector do in reviewing:

    a. System design plans.
    b. System installations.
    c. Permit applications.

5. How often should septic systems and other types of wastewater systems be inspected?

6. How should residual wastes (e.g., septage) be disposed of, and where?

Moreover, the specific institutional requirements of a wastewater management program will depend on the scope of the program, as well as the applied technology. The level or scope of wastewater management programs will be determined on the basis of local needs, physical characteristics, and environmental sanitation and health objectives. The assessment of these complementing, yet diverse, management requirements will help prepare the framework for developing an operations plan.

GUIDE FOR OPERATIONS PLAN FORMULATION

This section of the chapter presents the major analysis steps to be conducted in selecting institutional options to carry out the system design, installation, and operation and maintenance functions, related to the operations plan. The discussion of analysis steps that follow apply to the preparation of an operations plan for both on-site and small community systems. Subsequent sections of this chapter will separate the discussion of management functions, i.e., design/installation and operation maintenance for both on-site and small community wastewater systems. In addition, the management of residual wastes is also addressed in the final section of this chapter.

The analysis steps involved in operations plan preparation include:

Step 1 -- Establish management requirements for proposed wastewater technologies.

    a. Design/installation.
    b. Operation and maintenance.
    c. Residuals disposal.

Step 2 -- Develop management alternatives.

Step 3 -- Assess existing agency capabilities.

Step 4 -- Review of institutional options and alternative management approaches.

Step 5 -- Develop methods to enforce operations plan requirements.

Step 6 -- Recommend modifications to organizational structure and/or administrative activities to carry out operations plan activities.

These steps are described below.

Step 1: Establish management requirements for wastewater technologies.

- **Design/installation**
- **Operation and maintenance**
- **Residuals disposal**

The level of effort required to perform system design, operation and maintenance, and residuals disposal depends to a large extent on the complexity of the technology involved. Different kinds of design, operation and maintenance, and residual disposal activities are involved with different types of wastewater technology. The structure and organization of the management program should be sensitive to technological as well as political and economic factors.

The first step in developing an operations plan is to define the technical requirements of the wastewater systems under consideration, and to translate those requirements into a set of management functions. Tables 22 and 23 describe the functions that are typically involved in managing small wastewater systems. Table 22 lists the major management functions related to the preparation of an operations plan. The table should be viewed as a checklist of tasks which need to be performed within a management system. Table 23 displays broad categories of functions along with specific technology in matrix form. The user should first specify the form of technology being applied, and then identify applicable functions that need to be provided. Where additional detail in explaining functional requirements is necessary, the user may indicate the technical practices that define how the functions are to be carried out.

Step 2: Develop management alternatives.

The purpose of this task is to aggregate the requirements for wastewater system management into a set of management alternatives for institutional analysis.

The user should recognize that a particular wastewater approach may consist of various forms of technology. (Refer to the example analysis presented in Chapter 2.) The results of the previous step will yield an array of technologies and management requirements. The purpose of this step is to assemble the required management functions into a number of management alternatives (one or more sets of management alternatives for each technical alternative under consideration).

Table 24 offers several optional approaches for arranging system design and maintenance programs. These approaches are presented in a "building block" format, expressing a range of possible management approaches within the two functional areas. Therefore, it is possible to select one or more management approaches for further institutional analysis.

Step 3: Assess existing agency capabilities.

Once the management implications of various alternatives are displayed (as a result of Step 2), it will be necessary to examine and evaluate the capabilities of existing regulations and enforcement personnel in performing necessary functions. Modifications to management procedures, activities, or responsibilities can then be defined to accommodate technological requirements.

Coordination with the evaluation of technologies is important to help define the level of emphasis required by the management program in providing technology needs and objectives.

Tables 25 and 26 present a generalized procedure for assessing the adequacy of regulatory programs to fulfill management requirements. Data needs for analysis and evaluation criteria for determining the necessity for modifications to current institutional arrangements are shown in these tables.

Before conducting any detailed organizational and regulatory analyses, the user should review steps 1 through 4 of the Users Guide in Chapter 3, "Selectión of Management Agencies."

Step 4: Review institutional options and management approaches for:

- **Design/installation**
- **Operation and maintenance**
- **Residuals disposal**

The preceding evaluation should have pointed out strengths and weaknesses of the existing institutional framework to perform various management functions. The sections of the chapter that follow (i.e., Institutional Options) present descriptions of alternative institutional arrangements for conducting system designs, operation and maintenance, and residuals disposal. These alternative institutional arrangements should be reviewed and compared with the evaluation of the existing regulatory program.

Step 5: Develop methods of enforcing operations plan requirements.

Procedures for enforcing operations plan requirements are generally specified in codes and ordinances administered by a state or local agency. Fines, violation orders, permits, statements of noncompliance and injunctions are commonly used judicial and administrative techniques for complying with regulations, correcting failing systems, or upgrading substandard systems. Table 27 identifies several important techniques used to gain entry onto private property and to require periodic inspections and maintenance of wastewater systems. Obtaining this authority may be a specified condition of a Federal construction grant.

Step 6: Recommend modifications to organizational structure and/or administrative activities to carry out functions prescribed in the operations plan.

Table 28 is a checklist of management functions, with space provided to identify the preferred institutional arrangements, according to the operation plan analyses conducted in this chapter.

Any modifications to the existing institutional structure should be evaluated subject to the criteria set forth in Table 29. (See Tables 19 and 20 for sample evaluation criteria and rating formats.)

TABLE 22. FUNCTIONS AND RESPONSIBILITIES OF MANAGEMENT ORGANIZATIONS

Planning/Administration

- Plan preparation
  - Wastewater facilities
  - Water supply/residuals disposal
  - Land use development
- Plan review coordination
  - Interagency coordination to facilitate plan review
  - Integration of land use and wastewater management program needs and objectives
  - Plan review and approval
- Research and development
  - Feasibility study of alternative institutional arrangements
  - Cost-effectiveness analysis of alternative wastewater treatment and disposal technology
- Office and staff management
  - Establish office policies and procedures
  - Maintain sufficient staff size to accommodate workload

Site Evaluation

- Guidelines for performing site evaluation
  - Procedures and data requirements
  - Licensing, certification, and training of site evaluators
- Determination of site limitations
  - Site inspections
  - Site testing and evaluations
  - Review and acceptance of findings

System Design

- Adopt system design standards
  - Performance standards and construction specifications
  - Licensing, certification, and training of system designers
- Select and design system
  - Design assistance
  - Preparation of construction drawings and specifications
- Design review and approval
  - Issue permits for system construction

Installation

- Establish procedures for system installation supervision
  - License, certify, and train system installers
  - Determine number of site visits and procedures
- Final inspection and approval
  - Issue occupancy permit
  - Prepare as-built drawings
  - Maintain records

Operation and Maintenance (O&M)

- Establish O&M procedures and responsibilities
  - Develop program for routine O&M
  - Establish methods for conducting periodic inspections and evaluations of system operation

TABLE 22. (CONTINUED)

  - Develop enforcement and regulation mechanisms as required to conduct inspections and repair failed systems
  - Establish emergency maintenance procedures
  - Define characteristics of failing systems
  - License, train, and certify persons conducting inspections, making repairs, and operating facilities

- Operate and maintain facilities
  - Conduct routine and emergency inspections
  - Make repairs and replace defective systems and equipment
  - Supervise major repair/replacement work
  - Maintain records of inspections, maintenance, and repairs
  - Issue permit renewals and system performance certifications

Residuals Disposal

- Develop procedures for residuals treatment and disposal
  - Determine acceptable residuals treatment and disposal locations
  - License, certify, and train persons involved in residuals transport and treatment facility operation
- Operate and maintain residuals disposal facilities
  - Develop reporting mechanism to identify origin, method and location of disposal, and volume of residuals disposal
  - Inspection of hauling equipment and treatment facilities

Financing

- Determine available source of funding
  - Apply for financial assistance
  - Secure funds for system construction and initial upgrading
  - Establish fee structure
- Establish billing and collection mechanisms
  - Charge fees for services rendered
  - Levy assessments
  - Monthly/annual billing and collection
- Set and collect user charges and fees
  - Finance debt service
  - Raise revenue for O&M

Monitoring

- Establish monitoring methods and evaluation criteria
  - Develop plans and specifications
  - Develop compliance reporting system
- Conduct environmental testing monitoring
  - Monitor groundwater quality
  - Monitor surface water quality
  - Report monitoring results

Public Education/Public Relations

- Develop educational programs and information transfer methods
  - Define audience of education program
  - Determine most productive education methods
  - Develop method of reporting system failures
- Inform public and program participants
  - Inform public of maintenance procedures, proper operation, and water conservation techniques
  - Disseminate information to professionals and contractors
  - Respond to inquiries, complaints, etc.

TABLE 23. TECHNOLOGY/FUNCTIONAL REQUIREMENTS MATRIX

Technical Component	Planning Admin.	Site Evaluation	System Design	Installation	Operation and Maintenance	Residuals Disposal	Monitoring	Public Relations	Other
Standard Individual Subsurface Disposal									
Alternative Individual Subsurface Disposal									
Individual Surface Discharge									
Individual Nondischarge System									
Individual Mechanical Treatment Units									
Individual Pumping Units									
Recycle Systems									
Water Conserving Systems									
Holding Tank									
Experimental Individual Systems									
Gravity Sewers									
Low Pressure Sewers									
Vacuum Sewers									
Conventional Small Community Treatment Facility									
Community Surface Discharge									
Innovative and Alternative Small Community Treatment Facility									
Community Subsurface Disposal									
Community Land Application									

SAMPLE FORMAT

TABLE 24. ALTERNATIVE APPROACHES TO SMALL SYSTEMS MANAGEMENT -- BUILDING BLOCKS IN INSTITUTIONAL ANALYSIS

System Design--Installation

- Rely on existing state and local regulatory programs to govern the design and installation of wastewater systems.
- Supplement existing regulatory programs with training and certification programs to ensure the participation of qualified public and private sector personnel and to standardize the design-installation process.
- Modify existing regulations to incorporate "best management practice" design standards to provide additional safeguards for system performance.
- Modify existing regulations to provide more thorough site reviews of individual lots and proposed subdivisions, and restrict the use of standard wastewater disposal systems to areas with optimum site conditions.

System Operation--Maintenance

- Rely on the homeowner to provide sufficient maintenance of his/her wastewater system.
- Supplement homeowner arrangement with educational programs to promote proper maintenance practices.
- Provide incentives for homeowner maintenance (of on-site systems) through the provision of accessible and inexpensive septage disposal facilities.
- Conduct routine inspections of new and existing wastewater systems as part of an areawide sanitary survey or pre-sale inspection.
- Mandatory maintenance provisions for both new and existing systems established by state or local regulatory programs (e.g., through maintenance permit provisions, certificates of compliance, or service contracts).[1]
- Establish formal management programs governing the design, installation, and maintenance of wastewater systems. (Systems could be owned by the homeowner or by a public entity.)

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[1] See Table 27 for further explanation of these mandatory maintenance enforcement techniques.

TABLE 25. DATA NEEDS FOR INSTITUTIONAL ANALYSIS

Organizational Analysis

1. Display the organizational structure of the regulatory program, noting responsibilties and authorities.
2. Determine number of agency staff assigned to wastewater management activities.
3. List responsibilities and qualifications of staff.
4. Assess time devoted (by staff persons) in performing the following duties:
   - Design/installation
     - Conducting site evaluations.
     - Reviewing permit applications.
     - Permit recording.
     - Installation inspections.
     - Recordkeeping of permits issued, as-built drawings, etc.
     - Other design/installation activities.
   - Operation and maintenance
     - Routine inspections.
     - Complaint inspections.
     - Supervision of system repair/replacement.
     - Other operation and maintenance activities.
   - Residuals disposal
     - Recordkeeping of septage pumpouts, failing systems, etc.
     - Regulation of septage haulers and disposal sites.
     - Water quality monitoring.
     - Other residuals disposal activities.
5. Assess other administrative/regulatory issues:
   - Total permit activity (permit applications reviewed and issued)
     - Daily average.
     - Monthly average.
     - Yearly average.

Regulatory Analysis

1. Assess adequacy of regulations to handle current and future wastewater problems.
   - Design standards, criteria, and general procedures.
   - Operation and maintenance rules and regulations.
   - Residuals disposal regulation.
2. Review procedures for modifying regulations.
   - Legislative actions.
   - Administrative actions.

TABLE 26. INSTITUTIONAL NEEDS ASSESSMENT ISSUES

- Organizational Analysis
  - Are staff persons being utilized effectively?
  - Are staff qualifications compatible with duties?
  - Is sufficient time being spent on performing management activities?
  - Can existing staff perform additional duties (i.e., operation and maintenance) or spend additional time on any single activity?
  - Are private sector entities utilized in the current regulatory program?
  - Are records of system installations, inspections, and septage pumping being accurately kept? Has the data been evaluated in an effort to improve the effectiveness of the management program?
- Regulatory Analysis
  - Do the existing regulations and ordinances contain sufficient emphasis on site evaluation, system design, installation procedures, operation and maintenance, and residuals disposal?
  - Have attempts been made to modify or update regulations in the past? What was the outcome?
  - Can local regulations be changed? What is the state local arrangement for wastewater system regulation?

TABLE 27. ENFORCEMENT METHODS -- OPERATIONS PLAN ACTIVITIES

Method	Description	Advantages	Disadvantages
Permissive legislation creating water management districts	Special legislation establishing the authority for managing wastewater systems.	Several states have adopted special legislation. Lends support and "legitimacy" to the concept of on-site wastewater management.	May be difficult to pass special state legislation unless adequate political and public support exists.
Maintenance permit	Method of defining homeowner responsibilities of system maintenance. Can be issued as a conditional provision to install the system. Provisions may specify frequency of inspections or septage pumping.	Effective tool for ensuring system maintenance. Invalid permit could prohibit sale of home (if attached to the property deed).	May require special ordinance to implement.
Service agreement or service contract	Contracts with a management entity or private firm which would outline the specific requirements for service.	Simple to administer when number of participants (i.e., agencies, customers, and firms) is small.	Could pose problems when large numbers of homes are involved.
Certificate of compliance	Property owner would retain maintenance responsibility. System would have to be inspected periodically and its operating condition checked to approve or disapprove the renewal application.	Periodic inspections would be used to determine performance characteristics of the system.	Septage pumping would probably not be sufficient proof of a satisfactory system, therefore, detailed inspection may be required.
Easement	Method for securing permanent legal access to private property. Can be obtained for a sewer line crossing private property or a general easement tied to the location of the septic system itself.	Easy to establish rights-of-way at the time of subdivision approval.	In the case of existing developments, homeowner attitude and number of homes are key factors for determining ease of administration.
Purchase of the system	Management entity can purchase the wastewater system (in addition to the right of inspection), and possibly lease back to homeowner. Also possible to require dedication of facilities by the developer.	Clearly specifies responsibilities for operation and mainte- of the wastewater system.	Many problems posed with this approach, such as public agency's reluctance to purchase or assume ownership (via dedication), of a system that is old or not in conformance with current regulations.
Presale inspection	Inspection by local regulatory agency at the time of home sale to assure that system is not failing, is structurally sound, and has been properly maintained.	Easy to implement. Added benefits of informing new occupant of location and proper mainte- of the wastewater system.	Requires support and coordination of realtors and mortgage lending institutions.
Costs for abatement (violation as encumbrance)	Where systems are failing, the management agency can issue orders to repair. If property owner does not respond, agency can repair the system and bill the property owner. Can also attach the unpaid bill as a lien on the property.	Effective technique that can be easy to administer.	Requires effective enforcement support from local regulatory agency.

TABLE 28. FUNCTIONAL RESPONSIBILITIES MATRIX

Identify specific management agency (i.e. special district, municipal authority, municipal government, county agencies, regional agencies, State agencies, Federal agencies, private organizations, and other groups) and indicate responsibilities of each agency

								Comments
Planning/Administration								
Plan preparation								
Plan review coordination								
Research and development								
Office and staff management								
Site Evaluation								
Guidelines and criteria								
Evaluation certification								
Site suitability analysis								
System Design								
Standards and criteria								
Designer certification								
System design								
Design review								
Permit issuance								
Installation								
Construction supervision								
Installer certification								
Record-keeping								
Permit issuance								
Operation and Maintenance								
Procedures and regulations								
Operator/inspector certification								
Routine inspections								
Emergency inspections								
System repair/replacement								
Repair supervision								
Performance certification								
System ownership								
Residuals Disposal								
Disposal regulations								
Hauler certification								
Record-keeping								
Equipment inspections								
Facility inspections								
Facility operation								
Financing								
Secure funding								
Set charges								
Collect charges								
Monitoring								
Reporting system								
Sampling								
Public Education								
Develop methods								
Disseminate information								
Respond to complaints								

TABLE 29. EVALUATION CRITERIA FOR OPERATIONS PLAN FORMULATION

Administrative/Legal Feasibility

- Does sufficient legal authority exist to perform required operations plan activities?
- Are current staffing size and qualifications adequate?
- Are experienced private sector representatives being utilized to their fullest extent?
- Can the existing or proposed management entity respond to changing user needs? Is the entity able to cope with potential adverse reactions to the use of small wastewater systems?

Institutional Feasibility

- Does the management agency (either current or proposed) have the capability to accommodate institutional change?
- Is there sufficient justification for expanded public agency involvement in operation and maintenance activities?
- Does the current state-local organizational structure permit institutional modifications to regulatory programs?
- Does a new agency need to be formed? Will this be politically acceptable?

INSTITUTIONAL OPTIONS RELATED TO SYSTEM DESIGN AND INSTALLATION

There are several types of institutions that carry out management activities for system design and installation. They include:

1. States.
2. Counties.
3. Cities, towns, villages, and townships.
4. Special purpose agencies.
5. Private individuals and companies.

Either singly or in combination, these institutional arrangements can be applied to carry out the following management functions associated with system design and installation:

1. Establish sanitary codes.
2. Conduct site evaluations.
3. Design small wastewater systems.
4. Review design proposals.
5. Issue installation permits.
6. Inspect system installations.
7. Prepare as-built drawings.
8. Issue occupancy permits.
9. License or certify system designers and installers.
10. Require performance bonds for installers and systems.

Table 30 provides a description of management functions and practices that are performed in designing and installing small wastewater systems, and generally identifies institutional options for implementation.

These functions can be carried out through various institutional arrangements. Functions associated with on-site system design/installation can be implemented through three broad institutional classifications:

1. State administration.
2. State-local administration.
3. Local government administration.

Institutional options for small community systems design/installation fall into two categories:

1. State administration.
2. State-local administration.

Several different approaches to implement these options are presented. Each description includes a sample arrangement of functional responsibilities and institutional options grouped

TABLE 30. DESCRIPTION OF DESIGN--INSTALLATION FUNCTIONS

		Implementing Entity				
		Public Agencies				
Function	Description	State	County/Regional	Municipal	Special Purpose Agency	Private Firms
Establish Sanitary Codes	Codes contain minimum standards for site evaluation, system design, construction procedures and materials.	●	●	●	●	
Conduct Site Evaluations	Assess site conditions via hydraulic conductivity tests, soil borings, observation pits, and other tests to determine site suitability and select an applicable wastewater system.	●	●	●	●	●
System Design	Specify system type, location, and size. Design is typically based on criteria specified in sanitary codes.				●	●
Design Review	Evaluate information about the site and recommended design, upon which approval or disapproval can be made. Procedures for design review vary widely.	●	●	●	●	
Permit Issuance	A fundamental regulatory procedure to enforce sanitary code provisions. Issuing a permit typically signifies that all conditions of the sanitary codes have been satisfied, and system installation can begin.	●	●	●	●	
Installation Inspections	Visit site to ensure that the system is properly situated and sized, and ultimately, properly installed. Several visits may be necessary to adequately inspect a system.	●	●	●	●	
As-Built Drawings	Prepared at the time of final installation inspection to document type, location, and size of the installed system, plus other pertinent data such as site evaluation results. Copies usually given to homeowner and filed by the permitting agency.	●	●	●	●	●
Issue Occupancy Permit	Official final approval of system installation; enables homeowner to assure occupancy. Can be revoked if system fails or if maintenance provisions are not complied with (e.g., maintenance permit provision).	●	●	●	●	
Licensing and Certification of Designers/ Installers	Require persons involved in system design and installation to pass a qualification exam, be registered to perform these activities, and/or be licensed. Certification and registration are typically voluntary mechanisms. Licensing can be an effective regulatory tool, if licenses are revoked if the performance of the licensed individual is not satisfactory.	●	●	●		
Bonding of Designers/ Installers and Systems	Bonding can help protect the homeowner from substandard installation. System bonding can be required of the installer or manufacturer to reduce the burden of the homeowner in the event of system failure within a specified period of time.	●	●	●	●	

according to the general categories listed. Supplemental information in the form of "illustrations" are also included to highlight different ways in which these institutional concepts have been implemented in actual situations. The information contained in these illustrations was derived from the Interim Study Report, "Management of On-Site and Small Community Systems," U.S. EPA, Municipal Environmental Research Laboratory, M687, November 1979, prepared by Roy F. Weston, Inc. The interim report documents the results of the earlier phase of this project--conducting case studies of state and local wastewater management programs. Subsequent chapters of this report are organized in a similar manner.

Regulating the Design and Installation of On-Site Systems

State Administration --

Under this arrangement, a state agency (e.g., a state health department or environmental protection agency) would promulgate and enforce statewide regulations governing individual systems. State-employed sanitarians (and other professionals) would administer a state code (and perhaps locally-adopted modifications to that code) governing the installation of all on-site systems within the state. The sanitarians would be stationed at a centralized location and possibly at regional field offices. Their duties would include site inspections, system design, technical assistance/public information, plan reviews, permit issuance, and installation supervision.

In order to improve system design and site evaluation efforts, specialists in soils analysis and system design may be required to provide technical assistance to persons contemplating the construction of on-site systems. Training, certification and licensing of system designers, site evaluators, and system installers by the state regulatory agency should also be considered. Table 31 displays the various roles a state agency can assume in on-site system design/installation. New Hampshire is one example of a state that has adopted this approach.

STATE ADMINISTRATION -- ON-SITE SYSTEMS ILLUSTRATION

The State of New Hampshire Water Supply and Pollution Control Commission (WSPCC) is an example of a state agency which has complete regulatory authority over the design and installation of on-site systems within the state. The state has prepared a detailed technical

TABLE 31. STATE ADMINISTRATION -- ON-SITE SYSTEMS

Description: A state agency with staff at central and regional locations would administer state sanitary code provisions, statewide.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

	Option 1	Option 2
Establish Codes	State legislature or health board	State legislature or health board
Site Evaluation		
Soil testing	State sanitarian	Engineer/specialist[1]
Site inspections	State sanitarian	Engineer/specialist[1]
System Design	State sanitarian or engineer/specialist[1]	Engineer specialist[1]
Design Review	State sanitarian	State sanitarian
Installation Permit	State sanitarian	State sanitarian
System Installation	Property owner/developer	Property owner/developer
Installation Supervision	State sanitarian	State sanitarian
As-Built Drawings	State sanitarian	State sanitarian
Occupancy Permit	State sanitarian	State sanitarian
License Designers/ Installers	State agency	State agency
Performance Bonding	State agency	State agency

EVALUATION:

Responsiveness: May lack sufficient mobility and visibility to interact with general public. Depends on orientation to field office staffing.

Enforcement: Can overcome difficulties that localities often have in proing strict code enforcement due to political pressures.

Sensitivity: Major constraint is lack of flexibility and sensitivity with respect to local conditions and needs.

Staffing: Has sufficient fiscal base and economies to provide qualified specialists to assist in plan review and approval; again, depends on field office orientation to become acquainted with local needs.

Coordination: Potential exists for local governments to be insensitive and unresponsive toward public health and environmental concerns, if burden of on-site system review and approval is left totally with state agencies. Local land use plans and zoning ordinances need to be sensitive to wastewater management requirements.

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[1] Hired by property owner or developer.

STATE ADMINISTRATION -- ON-SITE SYSTEMS ILLUSTRATION (CONTINUED)

manual that sets forth system design criteria, recommends site evaluation procedures, and minimum lot sizes, according to the type of soil and the proposed system size.

Regulation of on-site systems is administered by WSPCC at its central headquarters and four regional offices. The central office staff is responsible for reviewing plans, proposals, and system designs. The regional staff assist in this review by visiting the site before the system is installed, and then performing site inspections of precoverup installations, particularly at large subdivisions.

The WSPCC is currently considering the preparation of a detailed soils manual and a training and certification program for designers, and has initiated a series of seminars and workshops to help train persons performing soils evaluations and system designs. These latter programs are being considered in conjunction with a state exam and licensing program for soil evaluations.

State-Local Administration --

A variation of the previous approach is for the state regulatory agency to designate "agents" to administer state (or locally adopted) regulations. There are three basic ways the state agents approach can be organized (refer to Table 32):

1. State-employed agents can be contracted by local governments to administer locally-adopted on-site regulations (option 1).

2. State-employed or certified agents, along with a local representative (e.g., local health officer), can administer on-site regulations (option 2).

3. Local health departments or health officers can operate as "agents" of the state in enforcing state- or locally-adopted rules and regulations. (In this case all, part, or more of the local staff salaries may be paid by the state) (option 3).

TABLE 32. STATE-LOCAL ADMINISTRATION -- ON-SITE SYSTEMS

Description: "State agents" working in conjunction with local agencies would provide the basis for a regulatory approach. There are three basic organizational arrangements for achieving a state-local cooperative approach.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

	Option 1	Option 2	Option 3
Establish Codes	State	State or local	State or local
Site Evaluation			
Soil testing	Agent or engineer/specialist	Agent	Agent or engineer specialist
Site inspections	Agent	Agent and local officials	Agent
System Design	Agent or engineer specialist[1]	Agent or engineer specialist[1]	Agent or engineer specialist[1]
Design Review	Agent	Local official	Agent
Installation Permit	Agent	Local official	Agent or local agency
System Installation	Property owner/ developer	Property owner/ developer	Property owner/ developer
Installation Supervision	Agent	Agent or local official	Agent
As-Built Drawings	Agent	Agent or local official	Agent
Occupancy Permit	Agent	Local official	Agent or local agency
License Designers/ Installers	State	State	State or local
Performance Bonding	State	State or local	State or local

EVALUATION:

Responsiveness: Has great flexibility for achieving close interaction with the general public. Option 2 is exemplary in this respect due to the interaction with the local official.

Enforcement: Capacity to enforce regulations will depend largely on local support in all options, however, option 3 has some of the same enforcement effectiveness advantages as state administration. This option will help ensure uniform enforcement throughout a state or region.

Sensitivity: Through local involvement, sensitivity to local needs can be assured.

Staffing: Has the ability to provide "specialists" services to localities without a major local cost burden.

Coordination: Has the same potential for land use/wastewater management conflicts as the state administration approach, except for option 3, which has more local regulatory support.

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[1] Hired by property owner or developer (may be state-certified or licensed).

In option 1, state-certified agents would perform all necessary design/installation activities (with the possible exception of system design). In the second option, a state-certified agent would concentrate on site evaluation and system design activities, while the local representative would review the permit application, issue the permit, and inspect the system installation. Under option 3, local agents can be considered state employees, however, they would work in local regulatory agencies.

The state agent approach offers an opportunity for local governments to more actively participate in the on-site system regulatory process, without creating a significant burden on local fiscal resources. This approach is most applicable to small rural communities that do not have the fiscal capacity to support the services of a professional to administer locally adopted or state minimum on-site regulations. State agencies may also provide education, training, and licensing programs for these agents which will help to ensure competent and qualified technical assistance to local communities. (In some states where this approach is practiced, an agent must either pass a qualifying exam or be a professional in the field of soils science, geology, or engineering.)

Another application of this approach is for the review of subdivision plats proposing on-site systems. Even though a local agency may issue a permit to install an individual septic system, the state may reserve the right to review (and possibly approve/disapprove) subdivision plats that propose on-site systems. The precise structure of the state-local arrangement in reviewing subdivision plats and the permitting of individual on-site systems will differ state-to-state. For example, one possible arrangement is to separate the review and approval of subdivision plans from the review and approval of individual system applications. The respective reviews and approvals, therefore, would be conducted independently, possibly by different agencies. An alternative approach is to condition the issuance of an individual system permit with the approval of a subdivision plan. Thus, the subdivision plan approvals and the issuance of individual system permits could be done simultaneously.

Examples of states that have adopted "agent of the state"-type programs follow.

STATE-LOCAL ADMINISTRATION -- ON-SITE SYSTEMS ILLUSTRATION

In Pennsylvania, the State Department of Environmental Resources (DER) has regulatory authority over individual and small community wastewater systems, but the on-site permitting program is administered by local governments through state-certified sewage enforcement officers (SEO). The approval authority for on-site systems rests totally with the SEO, whose salary is paid jointly by the DER and local governments. (The local share is raised partially through permit fees.) County sanitarians coordinate and assist the SEO's on technical matters.

The State of Maine Department of Human Services (DHS) is responsible for setting the minimum codes for small subsurface systems, which are enforced by certified and trained local agents (local plumbing inspectors -- LPI) employed by cities and towns. LPI's review and approve on-site system applications prepared by state-certified site evaluators.

The On-Site Specialists Program in the State of Vermont, initiated through the Vermont Association of Conservation Districts, represents a unique adaptation of the "agent-of-the-state" approach. On-site specialists, employed by the conservation districts, work for local health officers to administer locally adopted on-site regulations. Site evaluation, system design, and installation supervision are services offered by the on-site specialists to developers and local health officers. The specialists currently work in about 60 of the 250 towns in Vermont.

In Maryland and Virginia, county health agencies are principally responsible for regulating on-site systems, through adoption of a state minimum code or modification of the state code. County agency staff, however, are employees of the state government. They are responsible for enforcing locally-adopted codes, but are considered state employees. The regulatory procedures for administering design codes do, however, vary on a county-by-county basis.

Local Administration --

The third, and most popular, approach to administering on-site design regulations is for a local unit of government (county or township health department, regional health departments and special purpose agencies) to assume direct regulatory control over on-site systems. In these instances, the local government can prepare its own set of regulations or adopt (or modify) the state minimum regulations (if available).

The role of state government in a locally-administered program is variable. The state can:

1. Offer technical assistance to local regulatory agencies in reviewing subdivision plans and individual system applications.
2. Help to finance local programs through operating grants.
3. Hold workshops, seminars, and other instructional programs for system designers, site evaluators, system installers, and local sanitarians.
4. License and certify system designers, site evaluators, system installers, and local sanitarians.
5. Evaluate the performance of local regulatory programs and offer guidance in program administration.
6. Assume direct regulatory control for on-site systems installation in localities that do not have regulatory programs.
7. Supervise the administration of local regulatory programs through local permit reviews.
8. Issue approvals and permits for "experimental" or innovative on-site systems.
9. Assume responsibility for review of on-site system applications in certain situations (with authority to override local decisions).

As displayed in Table 33, there are a variety of ways in which local units of government can administer on-site regulations. The local regulatory agency can be a county or township agency (e.g., a health department), a special service district or other local government entity. The size and qualifications of the staff and the regulatory and administrative procedures followed by the local regulatory agency can differ widely even among agencies of similar institutional structure. The performance, policies, and size of local regulatory agency staffs will ultimately be affected by the fiscal and political support given to local regulatory programs from both state and local levels. Several examples of locally administered on-site management programs follow.

LOCAL ADMINISTRATION -- ON-SITE SYSTEMS ILLUSTRATION

The state-local relationship for regulating on-site system design in the State of Illinois illustrates the typical organizational structure for this regulatory activity in most states which share regulatory responsibilities with local governments. The state minimum code for designing and installing on-site systems is administered by local (i.e., county and multicounty) health agencies. The local health agencies have the authority to adopt codes that are more stringent than the state minimum (with state approval). Local health agency procedures for conducting site evaluations and preparing system designs vary. The state, however, does license system installers. Some county health agencies have established more rigid installer requirements which are administered locally. County health departments are staffed to perform design reviews, precoverup system inspections, and occasionally site evaluations (or reviews of reported site investigations). The local programs are funded through locally-administered special assessments and general funds, and state transfer payments.

In parts of the state where county health departments do not exist (i.e., in sparsely-developed areas), the State Health Department regulates on-site systems installations, primarily through the licensing of system installers. The state promotes the formation of local regulatory programs, offers technical assistance

TABLE 33. LOCAL ADMINISTRATION -- ON-SITE SYSTEMS

Description: A local agency, a county or township agency, a special service agency, and multilocal or regional entities can become the principal regulatory agency for on-site system design/installation.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

	Option 1	Option 2
Establish Codes	State or local	State or local
Site Evaluation		
Soil testing	Agency[1]	Engineer/specialist[2]
Site inspections	Agency	Engineer/specialist
System Design	Agency	Engineer specialist
Design Review	Agency	Agency
Installation Permit Issuance	Agency	Agency
System Installation	Agency or property owner/ developer	Agency or property owner/ developer
Installation Supervision	Agency	Agency
As-Built Drawings	Agency	Agency
Occupancy Permit	State sanitarian	State sanitarian
License Designers/ Installers	Agency	State or agency
Performance Bonding	Agency	State or agency

EVALUATION:

Responsiveness:	Exhibits great deal of responsiveness to local needs.
Enforcement:	Potentially vulnerable to local political pressure. Regional (multicounty or multimunicipal) regulatory agencies may provide sufficient protection from political influences. Subject to wide variability in enforcement attitudes and effectiveness within a state. Option 1 creates a management agency with total responsibility for system design/installation.
Sensitivity:	Standards and procedures can be established according to local physical and manmade conditions.
Staffing:	Subject to wide variability in staff size and qualifications among local agencies.
Coordination:	Provides efficient means of integrating land use and other local management objectives with wastewater management policies.

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[1] Refers to local agency, local health department, regional health agency, or special purpose agency.

[2] Hired by the developer (may be certified and/or bonded by state or local agency).

LOCAL ADMINISTRATION -- ON-SITE SYSTEMS ILLUSTRATION (CONTINUED)

to preestablished local programs and sponsors statewide seminars for local sanitarians, installers, and system designers.

The State of California does not have a minimum code, and local regulatory agencies (i.e., county, city, and special districts) implement locally derived and adopted codes. Each Regional Water Resources Control Board must review and approve on-site disposal ordinances for counties within its jurisdiction. The regional basin plan specifies minimum requirements for design of individual systems with which counties must comply. These requirements vary among the Regional Board, as well as among counties within a particular region.

The variation in design requirements among counties and regions reflects the state policy of establishing regulations according to unique local conditions.

Local county health departments work with the California State Health Department on some matters concerning on-site disposal. The State Health Department acts in an advisory capacity to those counties having a health department (46 out of California's 58 counties). For the 12 counties without health departments (rural counties with relatively low populations), the counties contract with the State Health Department to implement county-adopted on-site disposal ordinances. Ten state district health offices have environmental health units which provide technical support to counties on request or by contract.

In the State of Idaho, counties (in cooperation with the state health agency) have formed regional health agencies to provide some insulation for plan reviewers from local political pressure and to establish design criteria consistent with unique regional climatic and physical conditions. This type of geographic arrangement also allows for a larger financial base to support agency efforts.

LOCAL ADMINISTRATION -- ON-SITE SYSTEMS ILLUSTRATION (CONTINUED)

States which have delegated regulatory authority to local units of government may wish to reserve its authority, when it is felt that a local entity is not doing a satisfactory job. Regulations drafted (but not yet effective) in Connecticut, for example, would allow the State Department of Environmental Protection (DEP) to delegate authority over on-site wastewater disposal on an almost case-by-case basis, depending on the expertise of the individual locality. According to Connecticut regulations, candidates for state delegation include other state agencies and municipal or district health agencies.

It has been similarly proposed in the State of Wisconsin that the State Department of Health and Social Services evaluate each local (county) regulatory program (on the basis of installation permits issued) to check the effectiveness of local regulatory efforts. The state agency can suspend the local agency's authority to issue permits, if a local program is found to be ineffective, according to state review guidelines. (The State of Illinois Department of Health also conducts program reviews of county health departments to determine the amount of state aid for local regulatory programs.)

Stinson Beach, California, is an example of a community which has organized a comprehensive on-site management program, through a special district. The district has the authority to regulate new system installations (in conjunction with the Marin County Public Works Department), to rehabilitate and repair failing systems (through its own set of regulations), as well as to inspect and maintain both existing and new systems. The district is staffed by one full-time and one part-time technician. These persons are assisted by a consultant who reviews plans for rehabilitated systems; the county reviews plans for new installations.

Regulating the Design and Installation of Small Community Systems

State Administration --

States can delegate the authority for regulating individual on-site systems (serving a single residence) to local units of government, but retain the responsibility for reviewing and approving small community systems (serving more than a minimum number of residences). Under this arrangement, the state agency has the option of:

1. Issuing a permit to construct the small community system (based on state review and approval) and inspecting its installation.

2. Delegating the authority for permit issuance and installation supervision to local units of government upon state review and approval (see Table 34).

This latter arrangement can be advantageous from an efficiency point of view (since local system inspectors may be able to visit the construction site more frequently than state-employed counterparts). This approach, however, may be unrealistic if the local inspectors have not been trained (and certified) or are not familiar with these types of systems. Examples of states taking this approach to small community system management include Maine, Pennsylvania, Vermont, and New Hampshire.

STATE ADMINISTRATION -- SMALL COMMUNITY SYSTEMS ILLUSTRATION

The State of Maine offers an example of a regulatory program where small community systems are approved by a state agency, with permit issuance authority retained by a local agent (or representative) of the state. According to the state plumbing code, all systems with wastewater flow greater than 3,000 gpd are reviewed and approved by the State Department of Human Services (Division of Health Engineering). Upon state approval, permits are issued by local plumbing inspectors (certified by the state agency), who are then charged with supervising system installation (with assistance from State Health Department staff). State-certified site evaluators (who are typically soil scientists and geologists) must perform site investigations, and a professional engineer must design the systems.

TABLE 34. STATE ADMINISTRATION -- SMALL COMMUNITY SYSTEMS

Description: State agencies can assume responsibility for reviewing and approving small community wastewater system designs and issue permits for construction.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

Establish Codes	State
Site Evaluation	
Soil testing	Engineer/specialist[1]
Site inspections	State
System Design	Engineer/specialist
Design Review	State
Installation Permit Issuance	State or local
System Installation	Developer
Installation Supervision	State or local
As-Built Drawings	State or local
Occupancy Permit	State or local
Design/Installer Licensing	State
Performance Bonding	State

EVALUATION:

Responsiveness:	May inhibit interaction with developers and local decision-makers on controversial projects.
Enforcement:	State has total authority to manage system design and installation.
Sensitivity:	State-developed design criteria could have sufficient flexibility to address major common problems.
Staffing:	Principal advantage of state approach is that experienced and qualified specialists can be staffed on a statewide level. Efficiencies can be derived by sharing review staff and common design criteria between the 201 Construction Grants Program and land development review and approval programs.
Coordination:	By relinquishing plan review and approval authority to a state agency (for new multilot developments), local governments could partially lose control of the timing, location, and density of development within their jurisdiction.

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[1] Qualifications of engineer/specialist would be defined in state regulations.

STATE ADMINISTRATION -- SMALL COMMUNITY SYSTEMS ILLUSTRATION

Pennsylvania's Sewage Enforcement Officer (SEO) operates in much the same way with respect to the issuance of permits and plan reviews. In Pennsylvania, the state reviews and approves plans for all systems greater than 10,000 gpd (and for smaller systems upon request of the SEO), and the SEO then issues a permit for construction and inspects the installed system.

Pennsylvania also administers a subdivision evaluation and review requirement to coordinate plan reviews of major developments by state and local regulatory agencies.

In Vermont, the state has adopted regulations which require state review and approval for various types of small community wastewater systems in subdivisions where lots are less than 10 acres each. The state regulations provide for the evaluation of hydrogeologic and groundwater quality impacts (at the discretion of the state agency) where significant water pollution problems are suspected. The regulations also specify that a professional engineer must design small community systems, and where projects propose wastewater volumes greater than 10,000 gpd, a predesign conference between the engineer and state agency personnel must take place to discuss proposed design concepts.

New Hampshire's approach to the plan reviews of small community systems is an excellent example of state efforts to coordinate land development and 201 Facility Planning Program design review procedures. In this state, the review and approval of small community systems is the shared responsibility of the Small Systems Division (in charge of approving individual onsite system applications) and the Design Review Division (responsible for 201 plan review) within the New Hampshire Water Supply and Pollution Control Commission. The Design Review Division is typically looked upon as the specialists in small community systems, while the Small Systems Division is in charge of the wastewater plan review and permitting program for new developments in the state.

State-Local Administration --

As small community systems are more commonly proposed, local regulatory agencies are becoming more sophisticated and capable of handling the technical reviews. The regulation of small community systems design and installation has, therefore, shifted somewhat to local governments. The distinction between state and local responsibility is typically based on either the wastewater volume of the proposed system, the number of lots within the subdivision development, or whether the proposed system is a surface or subsurface discharge system. The precise delineation of regulatory authority differs from state-to-state. As shown in Table 35, large wastewater systems and subdivisions are usually regulated by the state (option 1) while smaller systems and developments remain with local governments (option 2). Some states have chosen to provide technical support to selected local agencies (in addition to retaining regulatory authority in others) by delegating regulatory authority for small community systems to selected local governments on the basis of staff size and capability.

Combinations of state- and locally-administered programs are illustrated by the examples that follow.

STATE-LOCAL ADMINISTRATION -- SMALL COMMUNITY SYSTEMS ILLUSTRATION

In the State of Washington, local health departments regulate individual systems less than 3,500 gpd. Larger systems (up to 14,500 gpd) with subsurface disposal can also be regulated by the local health agencies or by the state health agency (depending on individual circumstances). Another state agency, the Department of Ecology, regulates all small community systems with flows greater than 14,500 gpd and all small community systems with surface-water discharge. The State Health Agency (Department of Health and Social Services) offers technical assistance to local health departments in their design review of small community systems.

In states like Maryland and Illinois, small community systems (with subsurface disposal) are regulated by the county health departments, with state agencies offering technical assistance or project reviews on a request basis. Small community systems with surface-water discharge, however, are regulated by the state.

TABLE 35. STATE-LOCAL ADMINISTRATION -- SMALL COMMUNITY SYSTEMS

Description: The regulation of small community system designs can be shared between state and local agencies through a threshold screening process.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

	Option 1	Option 2
Establish Codes	State	State
Site Evaluation		
Soil testing	Engineer/specialist	Engineer/specialist
Site inspections	State or local	Local
System Design	Engineer/specialist	Engineer/specialist
Design Review	State	Local
Installation Permit Issuance	State or local	Local
System Installation	Developer	Developer
Installation Supervision	State or local	Local
As-Built Drawings	State or local	Local
Occupancy Permit	State or local	Local
Designer/Installer Licensing	State or local	State or local
Performance Bonding	State or local	State or local

EVALUATION:

Responsiveness:	Close working relationship between state agencies and local governments will help resolve and avoid any potential problems in dealing with the general public.
Enforcement:	Adequate enforcement authority would exist for either state or local government agencies. A common problem with this approach is that a developer can choose which jurisdiction (state or local) he wishes to have review development proposals by simply adjusting the size of the development or wastewater system accordingly. Sometimes difficult to precisely define the capacity of some of the treatment units proposed.
Sensitivity:	Standards and procedures could be flexible to handle difficult problems.
Staffing:	Efficiencies can be achieved at state level, but some overlap exists.
Coordination:	For new developments, many small scattered subdivisions could result if "Enforcement" problem above is applicable.

INSTITUTIONAL OPTIONS FOR OPERATION AND MAINTENANCE

The performance of any wastewater system is greatly affected by the attention given to the day-to-day operation and maintenance of the system. This is as true for an individual septic tank system in someone's backyard as it is for a large, expensive centralized collection and treatment system.

The activities involved in maintenance range from relatively simple routine maintenance tasks to the fairly complicated operation of treatment facilities requiring special experience and training. Many well-designed and well-constructed wastewater systems have failed because of improper operation and maintenance.

Table 36 displays the management functions and typical activities involved in system operation and maintenance. The list includes:

1. Establish operational performance standards.
2. Define system ownership.
3. Conduct routine maintenance.
4. Correct failing systems.
5. Educate homeowners in proper maintenance practices.
6. Monitor system performance via water quality sampling.

As shown in the table, these activities can be provided by a wide variety of institutional options. They can be administered by a public agency, a private contractor in conjunction with a public agency, a separate unit of government (a special purpose agency), or can be left to the homeowner. Selecting the appropriate agency or organization to provide maintenance services depends on the capabilities and the willingness of existing public agencies to provide such services and the availability of qualified private contractors. Moreover, the selection of the appropriate management agency is also influenced by the level or scope of maintenance services required for the specific situation. The level of desired management depends on the density of population, size of the development, physical characteristics at the development site, status of system ownership (i.e., whether the system is privately or

TABLE 36. DESCRIPTION OF OPERATION AND MAINTENANCE FUNCTIONS

		Implementing Entity				
		Public Agencies				
Function	Description	State	County/Regional	Municipal	Special Purpose Agency	Private Firms
Establish Performance Standards	Providing guidance on maintenance and performance criteria. Can involve requirement for periodic inspections and maintenance.	●	●	●	●	
System Ownership	Establishing fiscal and legal responsibility for system maintenance and repair.		●	●	●	●
Routine Maintenance	Conducting periodic inspections of on-site and small community systems, and septage pumping. Inspection frequency can be fixed at a defined time interval (e.g., 1 to 3 years) or limited to the time of home sale (e.g., presale inspections). Inspection provisions can also be tied to maintenance permit provisions. Septage pumping can be done based on the system inspection, or required at a defined time interval (e.g., 3 to 5 years). Septage haulers may be required to inform regulatory agencies of pumping events and disposal sites.		●	●	●	●
Correction of Failing Systems	Correcting a problem system involves: 1. Conducting inspections to determine the cause of failure and remedial action required. 2. Issuing a permit for system repair or replacement. 3. Performing the repair and replacement work. Enforcement methods to require system corrections include violation orders, citations for repair, and abatement charges.	●	●	●	●	●
Homeowner Education	Informing the homeowner of suggested or required maintenance practices.					
Monitoring	Water quality sampling and analysis to identify major quality problem areas where sanitary surveys may be necessary.					

publicly owned), and administrative requirements (e.g., EPA construction grants require management responsibility by the grantee).

Certain levels of management exist for providing operation and maintenance of individual systems, depending on the local situation and the involvement of existing regulatory agencies. These include programs which require inspections of individual systems, programs which provide specialized maintenance services to individual systems (such as septage pumping), and programs which provide system maintenance in addition to design and installation services.

There are three basic programmatic approaches to providing operation and maintenance services to individual on-site systems. These three management schemes illustrate the variety of institutional arrangements that can be applied to the operation and maintenance function:

1. Maintenance by private (for profit and nonprofit) entities (subject to public agency rules).
2. Maintenance by a local unit of government.
3. Maintenance by a specialized management entity.

The operation and maintenance of small community systems can be provided through the following institutional options:

1. Maintenance by local units of government.
2. Maintenance by private utilities or companies.
3. Maintenance by specialized management entities.
4. Maintenance by nonprofit corporations (e.g., property owners' association).

Alternative institutional approaches to the operation and maintenance of on-site and small community systems are discussed on the pages that follow.

Providing for the Operation and Maintenance of On-Site Systems

Maintenance by Private Entity --

The traditional approach to on-site maintenance is to leave the operation and maintenance responsibilities to the homeowner, with public agency intervention where a problem is identified or suspected. Depending on local circumstances and the need for formal maintenance services, the homeowner can provide various system maintenance activities. For example, educational materials can be made available to homeowners to inform them of required system maintenance practices. Also, local septage disposal firms who perform this service in an acceptable manner could be managed by the public agency to assure pumping and safe disposal of septage at specified intervals, with a means of tracking and enforcement. Presale inspections and frequent sanitary surveys may also serve as preventive maintenance mechanisms where on-site systems are applied.

Table 37 displays two institutional options for homeowner maintenance. Option 1 places the responsibility for providing maintenance on the homeowner or family that uses the system. In option 2, a private hauler contracts with the homeowner (directly) or a property owners' association (as a group) for periodic maintenance services. In this latter case, the property owners' association would assess each homeowner a fee to cover the costs for periodic inspections and bill the homeowner separately for tank pumping.

A less direct method of assuring proper operation of on-site systems which should also be considered, involves enforcement of conservative, less operation and maintenance intensive, system design criteria. Thus, the management program, where formal maintenance provisions are difficult to enforce, would trade off increased capital costs due to conservative system design for reduced operation and maintenance costs. (It is assumed that even in these instances some form of maintenance, such as periodic septage pumping, would be necessary.)

An alternative method of ensuring proper maintenance would be for the regulatory agency to place the responsibility for system operation and performance on the builder (or installer) of the system in the form of a mandatory guarantee for a designated number of years. (Such a guarantee provision would be included in the sanitary code or ordinance.) The installer would have to repair malfunctioning systems free of charge during the guarantee period. Private homeowners would then be more interested in inspecting their systems periodically (or contracting

TABLE 37. HOMEOWNER MAINTENANCE -- ON-SITE SYSTEMS

Description: In certain instances, the homeowner may provide system operation and maintenance. This approach, however, would not satisfy the management agency requirement for Construction Grants Program eligibility, without enforceable provisions for compliance by the grantee.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

	Option 1	Option 2
Establish Codes	State or local[1]	State or local[1]
System Ownership	Homeowner	Homeowner
Routine Maintenance		
Inspections	Homeowner[2]	Private hauler[3]
Septage pumping	Private hauler	Private hauler
Correction of Failing Systems		
Inspections	State or local	State or local
Permit issuance	State or local	State or local
System repair/ replacement	Homeowner	Homeowner
Homeowner Education	State or local	State or local
Monitoring	State or local	State or local

EVALUATION:

Responsiveness: The homeowner would be able to take immediate measures to correct a problem if aware of the consequences of no action.

Enforcement: Indirect enforcement of operation and maintenance is needed, since this approach relies on voluntary compliance. The existing regulatory agency would assure that failing systems are corrected and that the homeowners comply.

Sensitivity: A program like this can be beneficial in sparsely developed areas, or in developing areas as a preventive measure.

Staffing: Additional staffing requirements of the responsible public agency is minimal.

Coordination: Program implementation rests predominantly with the homeowner and the willingness of state and local government and private haulers to make information available and assure adequate septage disposal sites.

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[1] Appropriate state or local regulatory agency.

[2] Routine inspections are not mandatory. The homeowner can inspect the system himself, or a presale inspection by a local agency can be performed as a service to a mortgage-lending institution.

[3] Private hauler would contract with the homeowner directly or with a homeowners' association.

with a private firm to inspect the system), and a penalty would be assessed the builder if the design and construction of the system was not satisfactorily performed. Possibly, a performance bond would be useful in this approach.

Many layman-oriented manuals explaining proper maintenance practices have been prepared for state and local agencies throughout the country. Copies of such documents are usually made available through various public agencies to successful permit applicants or by the contractor at the time on-site systems are installed. Other types of programs which complement the homeowner maintenance approach are illustrated in the examples that follow.

HOMEOWNER MAINTENANCE -- ON-SITE SYSTEMS ILLUSTRATION

Presale inspections of on-site systems are conducted in Fairfax County, Virginia, at the request of the lending institution. The cost to the homeowner for such services is $25. The Minnesota Pollution Control Agency has been working with the Federal Housing Administration and the Veterans Administration to base mortgage approvals for existing homes on a certified on-site disposal system (through presale inspection).

Sanitary surveys are a means of identifying problem septic systems to complement homeowner maintenance activities. The surveys are performed by a variety of agencies, including state and local regulatory agencies, and property owners' associations. The State of Vermont Agency of Environmental Conservation conducts statewide sanitary surveys to identify failing on-site systems or inadequately designed on-site systems (e.g., straight-pipe discharges) near surface-water bodies. The annual surveys are conducted with state-employed water resource investigators. Many lake property associations and other watershed management entities have also taken on the responsibility of conducting sanitary surveys, using volunteers or students (during summer months). Methods of organizing lake property associations to perform problem detection activities and other duties have been developed in Wisconsin, Michigan, and California. In Maine, the Cobassee Watershed District conducted a detailed sanitary survey of lakefront septic systems to detect system failures. Similar sanitary surveys are being organized through the Maine Congress of Lake Associations.

HOMEOWNER MAINTENANCE -- ON-SITE SYSTEMS
ILLUSTRATION (CONTINUED)

The septic system management programs of Acton, Massachusetts, and Fairfax County, Virginia, highlight the potential role of public entities in providing septage treatment and disposal facilities, supplemented with public education efforts, to encourage homeowners to voluntarily maintain their septic systems. The Fairfax County Health Department also mails out reminders to homeowners to turn the diversion valves on their alternating drainfields. Similarly, in Stinson Beach, California, risers for all on-site systems (both new and existing) in the community must be installed to facilitate inspection and pumping. Detailed drawings noting the location, dimensions, and condition of all on-site systems are also left with the property owner to facilitate maintenance and promote property owner awareness.

Maintenance by Local Government --

Counties, towns, and multilocal agencies can provide on-site system operation and maintenance. These services would be provided through a statutory requirement for periodic inspections or septage pumping. The mandatory inspections could be performed by a public agency or a private firm contracted by the public agency or the homeowner. Similarly, periodic pumping could be performed by a public agency or a private firm. In either case, the homeowner would be responsible for making system repairs and paying for the maintenance services provided.

If mandatory inspections are performed by a public agency (option 1 in Table 38), the inspection workload can be shared by the entire agency staff, or a separate inspection unit can be established within the agency, depending on the agency organizational structure and manpower commitments. The former method offers an opportunity to coordinate individual system inspections with other complementary agency duties, and offers staff persons a means of monitoring the effectiveness of the regulatory program. A separate inspection unit would be able to staff on-site maintenance specialists and afford greater control over the inspection procedures. At the time of system inspection, the public agency representative can determine if tank pumping or other maintenance or repair activity is necessary. The agency could perform the tank pumping or make repairs

TABLE 38. LOCAL UNITS OF GOVERNMENT -- ON-SITE SYSTEMS

Description: State or local ordinances can require periodic inspection or pumping of septic systems. Local units of government can provide these services. The private sector also has a potential role.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

	Option 1	Option 2	Option 3
Performance Standards	State or local	State or local	State or local
System Ownership	Homeowner	Homeowner	Homeowner
Routine Maintenance			
Inspections	Local	Private hauler[1]	N.A.
Septage pumping	Local	Private hauler	Local or private
Correction of Failing Systems			
Inspections	Local	Local	Local
Permit issuance	Local	Local	Local
System repair/ replacement	Homeowner	Homeowner	Homeowner
Homeowner Education	State or local	State or local	State or local
Monitoring	State or local	State or local	State or local

EVALUATION:

Responsiveness: A private hauler contracted by a homeowner would probably be the most responsive to the homeowner's needs and problems. By requiring inspections (done by either a public or private entity) the homeowner's concerns about system performance can be dealt with at fixed intervals.

Enforcement: The local agency must have legal access to private property for inspection purposes for option 1. The local agency must also be able to require system corrections on the basis of periodic inspections or homeowner complaints.

Sensitivity: These different arrangements allow flexibility for management depending on need, as well as available resources.

Staffing: Options 1 and 2 (or to a lesser extent, option 3) require additions to public agency staff, depending on the number of systems to be served and the frequency of inspections.

Coordination: Public and private sector representatives need to develop effective cooperative mechanisms to assure successful application of most of the options presented.

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[1] Private hauler contracted by either local agency or homeowner to perform periodic inspections.

[2] Inspections are not explicitly required; only the pumping of septage at a prescribed frequency.

itself (and bill the homeowner accordingly), or require the homeowner to contract with a private septage hauler or septic system cleaner.

If mandatory inspections or periodic pumping were performed by a private company (options 2 and 3 in Table 38), a proof of inspection and required service statement would be forwarded to the regulatory agency. Should repair or replacement of the system be required, a regulatory agent should be notified to perform an inspection and recommend repair procedures. Where maintenance contracts with private companies are required, as is the case with proprietary mechanical on-site systems, the regulatory agency can check whether required maintenance contracts are being renewed by having the maintenance companies send the public agency notices of nonrenewals.

When involving the private sector in a mandatory maintenance program as just outlined, certain precautions should be taken:

1. Some assurances should be made (by the local agency) that only competent firms are involved in the program, and that a fair and equitable price is charged for inspections and pumping services performed. (Issuing franchise privileges or contracting directly with private firms will enable the local agency to ensure uniform service and prices.) Other possible approaches the public agency can take in protecting the homeowner from poorly qualified or overpriced contractors, would be to periodically publish the average quoted prices of the contractors serving the area, or to create a grievance board comprised of public officials, agency directors, and contractors to hear homeowner complaints.

2. There may be a tendency (on the part of private haulers) to perform unnecessary pumping or system repairs. Close monitoring of the competence of the service companies (through licensing, etc.), coupled with an educational program for homeowners (to inform them of proper maintenance practices) will help avoid problems such as this.

The participation of private septage haulers in a mandatory public maintenance program does, however, have the distinct advantage of alleviating legal and fiscal burdens on the local governing agency. Private sector participation in an on-site system maintenance program should, therefore, be given serious consideration by maintenance program designers.

Several local governments in the State of California have instituted different approaches to providing on-site operation and maintenance.

LOCAL UNITS OF GOVERNMENT -- ON-SITE SYSTEMS ILLUSTRATION

Several California counties have instituted septic system inspection and maintenance programs. The Marin County Health Department has established an on-site system maintenance requirement through the use of an occupancy permit. The permit is effective for two years from the time of installation, and must be renewed at two-year intervals. The cost of the inspection and renewal is $40 (or $20 per year).

The procedure for performing the inspection (in Marin County) is straightforward. A county health agent mails a letter to the homeowner reminding him to have his tank inspected. An inspection is scheduled and performed by the county agent in the presence of the homeowner (or representative). If the system is operating satisfactorily, the permit is renewed. Should repair or pumping be required, the homeowner must submit proof of repair or pumping before the permit is renewed (pumping would be performed by a private septage hauler). The inspection program applies only to on-site systems installed pursuant to the county sanitary code, adopted in 1971.

In Kern County, California several county service areas have been established where special on-site system maintenance procedures are required. In these county service areas, the County Department of Public Works conducts the system inspections and pumps the tanks, if necessary.

Santa Cruz County, California, is an example of a county regulatory program that requires periodic inspections as a provision of its sanitary code. County Health Department maintenance permit provisions at two county service areas are implemented largely through the efforts of an independent contractor certified by

LOCAL UNITS OF GOVERNMENT -- ON-SITE SYSTEMS
ILLUSTRATION (CONTINUED)

the County Health Department and hired by the County Board of Supervisors. According to regulations adopted by the Santa Cruz County Health Services Agency, subdivision developers must dedicate easements to each lot for inspection, maintenance, and expansion, and septic tanks must be pumped out once every three years.

Maintenance by Specialized Management Agency --

Much of the literature on the topic of on-site system maintenance discusses the viability of a "total management concept." Experts in the field of wastewater management have suggested that on-site systems be maintained by a centralized management entity, similar to a sewer utility. This management entity could be responsible for providing all major functions related to wastewater management, including system design, installation, and operation and maintenance. Expanded approaches to the total management concept would involve actual ownership of the individual septic systems by the management entity. The service area of the entity would also be flexible and subject to the enabling legislation of the particular state.

The management entity could be formed through special purpose agency legislation, or a local government entity (e.g., a local improvement district or department of a local government agency). Special purpose agencies generally have been viewed as the primary means of establishing a "total management" program. While the institutional approach has its advantages, an often cited disadvantage of the special purpose agency (and of "total management" programs) is that it promotes the proliferation of local government and the fragmentation of public services. Total management is not necessarily the most feasible or necessary approach in all situations. It does have numerous advantages, which have to be weighed with the need for such a formalized approach.

Table 39 presents the institutional options available to implement the "total management" concept. The basic difference among the three options listed is the system ownership arrangement -- either public or private ownership. Several examples of such programs follow.

TABLE 39. TOTAL MANAGEMENT CONCEPT -- ON-SITE SYSTEMS

Description: An appealing approach to providing on-site systems management is through the creation of a single, comprehensive management program to design, install, operate, inspect, and maintain on-site wastewater systems.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

	Option 1	Option 2	Option 3
Performance Standards	State or agency[1]	State or agency	State or agency
System Ownership	Agency	Homeowner	Agency or homeowner
Routine Maintenance			
Inspections	Agency	Agency	Homeowner or private hauler
Septage pumping	Agency	Agency or private hauler	Private hauler
Correction of Failing Systems			
Inspections	Agency	Agency	Agency
Permit issuance	Agency	Agency	Agency
System repair/ replacement	Agency	Homeowner	Agency or homeowner
Homeowner Education	Agency	Agency	Agency
Monitoring	State or agency	State or agency	State or agency

EVALUATION:

Responsiveness: Local agency would be concerned with providing rapid service to investigate homeowner complaints, particularly if the agency owned the individual system. Homeowners, however, may be less likely to become concerned with proper system operation, since the local agency owns and operates the individual system.

Enforcement: A total management agency would need sufficient capability to enter onto private property, perform maintenance, and require system repair or replacement. Special enabling legislation may be necessary to create management entities of this type.

Sensitivity: The total management concept is flexible enough to meet local needs.

Staffing: The use of private sector representatives could help reduce the staffing burden to public agencies. Can share management authority with existing regulatory agencies to avoid duplication of staff.

Coordination: Proper coordination with planning and zoning entities would be necessary to assure that the continued use of individual on-site systems would not pose serious water quality problems.

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[1] Refers to a specialized local management agency.

TOTAL MANAGEMENT CONCEPT -- ON-SITE SYSTEMS ILLUSTRATION

The Stinson Beach County Water District (SBCWD) and the Georgetown Divide Public Utility District (GDPUD) are two California on-site wastewater management districts organized as special purpose agencies. The SBCWD district was designed to provide maintenance services for existing and newly constructed on-site systems since January 1978. The GDPUD is also responsible for maintaining on-site systems; however, this management program started at the initial stages of a large residential subdivision, thus, few preexisting on-site systems came under its jurisdiction. Both the SBCWD and GDPUD provide for site design, installation, financing, and other supportive management activities in addition to operation and maintenance.

Another interesting feature of these management programs is the method used to enforce maintenance requirements. The SBCWD applies a maintenance permit-type approach, with inspection and renewal provisions. The GDPUD utilizes the service agreement concept, whereby a home buyer signs an agreement giving the district the authority to perform all necessary operation and maintenance duties. The nuisance abatement provisions of the appropriate county health agencies, supplemented by fines, liens, and injunctions provide these districts with the necessary enforcement tools.

Neither agency owns the individual on-site systems; system ownership remains with the homeowner in both cases. Therefore, where an inspection reveals a failed system or pumping requirement, a violation notice is issued and put on record (making it difficult to sell the home). The homeowner is liable for all costs of repair or pumping. If the homeowner does not perform the required repairs or pumping, the district (SBCWD or GDPUD) will undertake the work for him and bill the homeowner accordingly. Statutory provision in both cases has been made which requires the amount owed the agency to become a lien on the property.

The State of Washington has a requirement for permanent maintenance of on-site systems in certain subdivisions by an approved management entity. According to the state regulations, when subdivisions or

TOTAL MANAGEMENT CONCEPT -- ON-SITE SYSTEMS
ILLUSTRATION (CONTINUED)

multiple housing units have gross densities exceeding 3.5 housing units or 12 people per acre, or waste flows of 1,200 gallons per acre per day, on-site systems will not be permitted unless permanent maintenance is provided. Eligible management entities include public agencies such as county agencies, as well as special service agencies such as sewer and water utilities and special districts. If no public agency is able or willing to operate a management program of this type, a special management corporation may be organized to serve as the management agency. A third party agreement with a public agency is necessary, if a private management entity is to provide maintenance services.

The states of California and Illinois, along with others, have recognized potential problems associated with the use of special purpose agencies (as management entities) and have incorporated explicit requirements within current enabling legislation to avoid the problem of proliferation of local government or promotion of suburban sprawl. In order for an on-site wastewater disposal zone (a special purpose district) to be formed in California, the County Environmental Health Agency and the Regional Water Quality Control Board must determine the maximum number, type, volume, and location of on-site systems to be used within the zone without threatening health or water quality. According to Illinois enabling legislation, an on-site wastewater management zone can only be formed within the limits of an incorporated area or municipality. Several other states have also passed similar enabling legislation.

Providing for the Operation and Maintenance of Small Community Systems

Maintenance by Local Governments --

Small community systems can be owned, operated, and maintained by local units of government -- counties, towns, villages, etc. Table 40 shows the various options available in system ownership, maintenance, and operation. As presented in the table, the municipality can provide maintenance services on a contract basis to developers or property owners' associations,

TABLE 40. LOCAL UNITS OF GOVERNMENT -- SMALL COMMUNITY SYSTEMS

Description: A municipality can assume ownership and/or operation of small community systems within its jurisdiction.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

	Option 1	Option 2	Option 3
Performance Standards	State or local	State or local	State or local
System Ownership	Local	Private[1]	Local or private[1]
Routine Maintenance			
Inspections	Local	Local	Private contractor
Septage pumping	Local	Local	Private contractor
Correction of Failing Systems			
Inspections	Local	Local	Private contractor
Permit issuance	Local	Local	Local
System repair/ replacement	Local	Local	Private contractor
Homeowner Education	Local	Local	Local
Monitoring	State or local	State or local	State or local

EVALUATION:

Responsiveness:	Provides opportunity for immediate attention by local government, especially if system is publicly owned.
Enforcement:	Most state enabling legislation authorizes counties and municipalities to own, operate, and maintain small community sewerage systems.
Sensitivity:	A public agency (such as a county) can provide operation and maintenance services to several systems within its jurisdiction.
Staffing:	Public agencies can utilize other personnel to provide maintenance-related services to area sewerage systems.
Coordination:	Integration of land use and wastewater management objectives can be achieved.

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[1] Private ownership can be through a developer or property owners' association.

or can own and operate the system itself. Many municipalities have imposed special design and performance requirements on systems it intends to own or operate. As an example:

LOCAL UNITS OF GOVERNMENT -- SMALL COMMUNITY SYSTEMS ILLUSTRATION

In the State of Washington, departments of public works in several counties are providing operation and maintenance services for community septic tank-drain fields at subdivision developments. Maintenance (in the form of periodic pumping, drain field inspections and repair) is provided on a contract basis to homeowner associations, and developers as a part of municipally-operated maintenance services for systems dedicated to the municipality. One of the Washington counties (Kitsap County) which provides maintenance to community systems has established specific design criteria and construction specifications which must be adhered to before it assumes ownership or maintenance of these systems.

The state is currently promoting the use of municipal agencies to manage these small community systems, and is pursuing the concept of "satellite support systems" to provide maintenance to these scattered community systems. In a technical assistance role, the State of Washington Department of Social and Health Services has also been involved in conducting research on performance characteristics of community septic systems as a means of updating system design requirements and maintenance procedures.

Maintenance by Private Companies or Contractors --

Private utility companies can own and operate small community systems. Private contractors (e.g., plumbers, septic tank pumpers, etc.) could also become involved in providing operation and maintenance services on a contractual basis with developers, homeowners' associations, and public agencies (see Table 41). Private contractors and utilities can service a large area, and are not limited by political boundaries (except for the fulfillment of licensing, registration, or franchise service requirements by state and local regulatory agencies). This approach to small community system operation and maintenance is illustrated by the examples that follow.

TABLE 41. PRIVATE COMPANIES -- SMALL COMMUNITY SYSTEMS

Description: Privately-owned utilities or contractors could own and operate small community systems.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

	Option 1	Option 2
Performance Standards	State or local	State or local
System Ownership	Private company	Local or homeowners' association
Routine Maintenance		
Inspections	Private company	Private company
Septage pumping	Private company	Private company
Correction of Failing Systems		
Inspections	Private company	Private company
Permit issuance	State or local	State or local
System repair/ replacement	Private company	Private company
Homeowner Education	Private company	Private company
Monitoring	Private company	State or local

EVALUATION:

Responsiveness:	Private companies would generally be very responsive to customer needs and problems.
Enforcement:	Local governments may need to provide supporting legal and enforcement assistance to require connections to the sewerage system and to assist in fee collection. State public service commissions may be involved in approving rate changes.
Sensitivity:	The local governing agency should be primarily responsible for delineating franchise areas.
Staffing:	Private companies would relieve the burden on public agencies of providing qualified technical staff.
Coordination:	This is primarily a function of local governing bodies.

PRIVATE COMPANIES -- SMALL COMMUNITY SYSTEMS ILLUSTRATION

Most manufacturers of sewerage devices (e.g., grinder and effluent pumps, package treatment plants, etc.) offer maintenance contracts or guaranteed maintenance services to consumers. One large private development near Schenectady, New York (which has a pressure sewer collection system) uses the services of a grinder pump manufacturer located nearby to repair or replace pumping units. Another small town near Kansas City, Missouri (Weatherby Lake) employs technicians (from a nearby airplane manufacturing plant) to service pump units on a part-time basis. These two examples illustrate not only the role of the private contractor to perform services on an "as needed" basis, but point out the importance of the availability of experienced maintenance personnel to ensure long-term systems operation.

In southern Florida, the General Development Utilities, Inc. (GDU) owns and operates conventional wastewater treatment facilities and water supply systems serving communities built by the General Development Corporation (GDC), a large land development corporation. Since 1971, GDU has been serving parts of two GDC-developed communities with septic tank-effluent pump (STEP) systems. Maintenance and administrative personnel are (to some extent) involved in both the management of the pressure sewer system and conventional wastewater facilities.

Many regulatory agencies are reluctant to rely on private utilities or private contractors to maintain wastewater systems because of concerns over the financial stability of the private firms. Local governments are particularly worried that they will have to take over the ownership and maintenance of wastewater systems abandoned by bankrupt companies. The public agency should require some assurances that the private company can financially provide the needed service or own and operate the wastewater system on a permanent basis. Regulatory agencies should, therefore, be concerned with the following items before allowing a private company to own and operate a small community wastewater system:

1. Corporate structure and by-laws.
2. Financial solvency (a state public utility commission should audit the firm).
3. Sponsorship (or trusteeship) by a public agency or recognized private corporation in the event a transfer of ownership is necessary.
4. Performance bonding for a time period adequate to begin system operation.

Enforcement of maintenance and reporting requirements by regulatory agencies is also important to assure satisfactory long-term system operation.

Maintenance by Special Purpose Agencies --

Maintenance of small wastewater systems by special purpose agencies (e.g., sanitary districts, sewer authorities, sewer districts, etc.) is a widely-used institutional approach, because of the flexibility of this type of arrangement. Special purpose agencies can be established by a municipality or by resolution of residents within the service area (depending on state enabling legislation). Generally, special purpose agencies have the powers to own, operate, and maintain wastewater facilities, and to finance their construction and operation.

Table 42 displays three options for providing operation and maintenance of small community systems. Two examples of special purpose agencies follow.

SPECIAL PURPOSE AGENCY -- SMALL COMMUNITY SYSTEMS ILLUSTRATION

Lake Meade, Pennsylvania is one of many examples of lakefront communities across the country that have installed grinder pump/pressure sewer systems for wastewater collection. The lake community (which is situated in part of two municipalities) consists of about 300 homes. The Lake Meade Municipal Authority (LMMA) owns and maintains the pressure sewer system and treatment plant, and installs all grinder pumping units.

The LMMA and a utility easement were created by the developer and sponsoring municipalities in the late 1960's. The initial planning for sewerage service for

TABLE 42. SPECIAL PURPOSE AGENCY -- SMALL COMMUNITY SYSTEMS

Description: Special purpose agencies offer a convenient means of managing small community systems.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

	Option 1	Option 2	Option 3
Performance Standards	State or local	State or local	State or local
System Ownership	Agency[1]	Homeowner	Homeowner
Routine Maintenance			
Inspections	Agency	Agency	Private contractor[2]
Septage pumping	Agency	Agency	Private contractor[2]
Correction of Failing Systems			
Inspections	Agency	Agency	Private contractor
Permit issuance	State or local	State/local/agency	Agency
System repair/ replacement	Agency	Agency	Private contractor
Homeowner Education	Agency	Agency	Agency
Monitoring	Agency	Agency	Agency

EVALUATION:

Responsiveness: The responsiveness of this institutional arrangement will depend on the representativeness and access of the agency's governing board to the general public.

Enforcement: Generally special purpose agencies have the necessary powers to operate and maintain small wastewater systems.

Sensitivity: Special purpose agencies can be created to serve broad areas, e.g., individual municipalities, groups of municipalities, or parts of municipalities, thereby serving only the areas of greatest need.

Staffing: Technical staff can be made available through agreements with local governments or with private contractors.

Coordination: Local governments should provide the necessary coordination with other on-going public service programs.

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[1] Special purpose agency.

[2] Private contractor hired by the homeowner or the special purpose agency.

SPECIAL PURPOSE AGENCY -- SMALL COMMUNITY SYSTEMS ILLUSTRATION (CONTINUED)

the lake community began in the mid-1970's, and operation of the treatment plant and collection system started in 1977.

The LMMA employs one full-time and one part-time treatment plant operator-technician to manage the sewerage system (i.e., pump and collection system maintenance, and plant operation).

In Westboro, Wisconsin, a septic tank/small diameter gravity sewer system and community drain field were installed in the mid 1970's as a result of widespread septic system failures in this small town. A sanitary district was formed to inspect and maintain the septic systems and drain fields and to regulate the design of individual septic tanks required at each home. The district now owns the individual septic tanks, gravity sewer lines, and community drain fields. Ownership of the existing septic tanks was acquired through an easement (i.e., a transfer of ownership from the homeowner to the district at a nominal fee).

Maintenance by Nonprofit Organizations --

A homeowners' association or some form of resident cooperative may be the only organization available to assume operation and maintenance responsibilities for small community systems. (This may be particularly true in rural areas.) With a sufficient legal framework (see the Chapter 3 discussion on nonprofit corporations), these organizations can provide an adequate mechanism for system ownership, user fee assessment and collection, and system maintenance, where allowable.

Table 43 displays two options for providing operation and maintenance through nonprofit organizations. These options are:

1. By contract to outside firms.
2. By hiring a staff or by the members themselves.

An example of a nonprofit private management program is Otter Tail County, Minnesota.

TABLE 43. NONPROFIT CORPORATION -- SMALL COMMUNITY SYSTEMS

Description: A rural cooperative, homeowners' association, or other nonprofit organization could own, operate, and maintain small community systems.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

	Option 1	Option 2
Performance Standards	State or local	State or local
System Ownership	Nonprofit group[1]	Nonprofit group
Routine Maintenance		
Inspections	Private contractor[2]	Nonprofit group or homeowners' association
Septage pumping	Private contractor	Nonprofit group or private contractor
Correction of Failing Systems		
Inspections	Private contractor	Nonprofit group or homeowners' association
Permit issuance	State or local	State or local
System repair/ replacement	Private contractor	Nonprofit group or private contractor
Homeowner Education	Nonprofit group	Nonprofit group
Monitoring	Private contractor	Nonprofit group

EVALUATION:

Responsiveness: The nonprofit corporation concept is an attractive alternative for small community systems management since the wastewater system is owned by the residents themselves.

Enforcement: Regulatory agencies in most states have not approved small wastewater system management programs administered by homeowners' associations because of the lack of confidence in this form of management entity. The reluctance to use homeowners' associations (and other nonprofit organizations) stems from the concern that members of these groups cannot devote adequate attention to wastewater system maintenance because of their part-time status or widespread responsibilities to other association functions. Regulatory agencies may wish to consider the creation of third-party trusts or agreements to help ensure some degree of control over the quality and permanency of management services.

Sensitivity: A nonprofit corporation may be the only available option in some areas, in underdeveloped areas, or where local governments are unwilling to provide maintenance sources.

Staffing: Larger associations may be able to hire staff to perform all necessary administrative and maintenance duties, as well as contract with private firms or management companies for such services.

Coordination: Nonprofit corporations can originate from national organizations such as the National Demonstration Water Project or the Appalachian Regional Commission.

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[1] A rural cooperative, homeowners' association, or other form of nonprofit corporation with its own staff.

[2] Private firm hired by the nonprofit organization.

NONPROFIT CORPORATION -- SMALL COMMUNITY SYSTEMS ILLUSTRATION

Small community wastewater systems installed to upgrade failing and substandard on-site septic systems in Otter Tail County, Minnesota, are operated and maintained by homeowners' associations. Members of these groups (group membership typically varies from 10 to 30 families) are responsible for checking pump operation and liquid depths in individual and community septic tanks. The typical wastewater system serving these small communities consists of individual system tanks connected to small diameter gravity sewers with wastewater disposal at a community drain field. The homeowners share the cost of electricity (about $4.00 per home per year) and service calls to a pump distributor, septic tank installer, or septage hauler when needed. The members of these groups are concerned with water quality protection because of the recreational value of the lakes, and along with technical assistance services (such as system design and maintenance recommendations) from the county regulatory agency, devote sufficient attention to system performance and operational requirements.

INSTITUTIONAL OPTIONS -- RESIDUALS DISPOSAL

A major component of the operation and maintenance function is the regulation of the disposal of residuals, i.e., septage from septic tanks and sludge from treatment facilities. A comprehensive regulatory program should be designed to assure that septage pumped from on-site systems and sludge accumulated at treatment facilities would be safely and properly disposed of at an approved facility. To accomplish these objectives, state and/or local regulatory programs should address the following major residuals disposal issues:

1. Disposal facility siting, design, design review, and construction approval.
2. Licensing and certification of individuals involved in the cleaning or repairing of septic systems and small community systems.
3. Licensing and certification of individuals involved in the transport of septage and sludge for treatment.
4. Recording septage pumping events, volume of residuals transported and location of disposal.
5. Periodic inspection and certification of all vehicles used to transport residuals.
6. Limiting the disposal of residuals to approved sites.
7. Regulating the method of disposal at those sites (i.e., establishing performance standards for facility operation residuals disposal).
8. Operating and maintaining residual disposal facilities in accordance with prescribed performance standards.
9. Inspection of treatment and disposal facility construction and operation.

These activities can be provided by several types of agencies, as well as the private sector:

1. State agencies.
2. County (or multicounty) agencies.
3. Municipal (or multimunicipal) agencies.
4. Special purpose agencies and public authorities.
5. Private companies (e.g., private septage haulers).

Table 44 illustrates a matrix of institutional options for various residuals management responsibilities. As shown, state and local agencies and private interests are involved in various aspects of residuals management. In most instances, state agencies are involved in setting criteria and establishing licensing programs, while local governments assume responsibility for the surveillance of hauler activities and the inspection of equipment and disposal facilities.

The determination of institutional arrangements for various residual management activities such as hauler registration, licensing, vehicle inspection, disposal facility design, etc. can be accomplished in conjunction with related wastewater system design and operation and maintenance institutional analyses. The selection of institutional arrangements for disposal facility ownership and operation, however, could require a separate institutional assessment. A discussion of alternative arrangements for septage disposal follows.

Public Ownership and Operation

Towns, counties, cities, or states can own and operate residuals treatment and disposal facilities. The facilities can be located in conjunction with a wastewater treatment facility, solid or hazardous waste disposal facilities, or consist of a separate treatment and disposal facility. In states where enabling legislation allows establishment of multigovernment ownership arrangements, such treatment and disposal facilities can serve a large geographic area. Because this arrangement relies on the participation of two or more units of government, certain legal measures may be necessary to protect the integrity of the arrangement from a withdrawal of one of its members. A multiyear membership requirement, with periodic extensions, may add stability to such an arrangement.

Both public and private haulers may be able to use the facility. For the single local unit of government (such as a county or municipality), the use of the facility could be restricted to haulers servicing residences within that jurisdiction (see Table 45, option 1). One variation could be that the facility is owned and operated by a single local unit of government, but accessible to persons residing outside its political boundaries (option 3). State agencies responsible for allocating construction grant funds for treatment facilities should consider a mandatory regional service area arrangement for newly constructed treatment facilities. These mandatory service requirements should be reflected in wastewater facilities plans and areawide water quality management plans.

TABLE 44. DESCRIPTION OF RESIDUALS DISPOSAL FUNCTIONS

Function	Description	Implementing Entity				
		Public Agencies			Special Purpose Agency	Private Firms
		State	County/Regional	Municipal		
Establish Criteria for Residuals	Criteria for disposal facility siting, design, and operation.	●	●	●		
Design Disposal Facility	Select type, location and size of treatment and disposal facility.	●	●	●	●	●
Design Review/ Permit Issuance	Evaluate site information and proposed design. Approve/disapprove recommended design. Issue permit to build facility.	●	●	●		
Facility Construction Inspections	Visit site to ensure facility is properly situated, sized, and installed. Several visits may be necessary.	●	●	●		
Facility Ownership	Establish fiscal and legal requirements for maintenance and repair.	●	●	●	●	●
Facility Maintenance	Conduct periodic inspection of facility operation. Inspection frequency is variable. Perform maintenance activities.	●	●	●	●	●
Regulation of Haulers and Hauling Equipment	Inspect pumping and transport vehicles. License pumpers. Approve pumpers utilizing disposal facility. Monitor hauler activities.	●	●	●		
Residuals Pumping and Transport	Pump residual waste and transport to disposal site. Could involve reporting of origin and destination of wastes.			●	●	●

TABLE 45. PUBLIC OWNERSHIP AND OPERATION -- RESIDUALS DISPOSAL

Description: States, counties and municipalities can own and operate residuals treatment and disposal facilities for single or multigovernmental use.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

	Option 1	Option 2	Option 3
Operational Performance Standards	State	State	State
Facility Ownership	Single governmental entity[1]	Multigovernmental entity[2]	Single governmental entity
Facility Service Area	Single governmental entity	Multigovernmental entity	Multigovernmental entity
Facility Operation	Single governmental entity[3]	Multigovernmental entity	Single governmental entity
Residuals Transport	Public/private[4]	Public/private	Public/private

EVALUATION:

Responsiveness: Local governments (counties and municipalities) are able to provide services for residents within their jurisdiction, and respond well to homeowner needs. Problems may appear in multilocal service arrangements.

Enforcement: Option 1 allows better coordination between small systems design and operation programs and residuals management. Option 2 can accomplish the same coordination if the regulatory structure for small systems design and maintenance fits one of these strategies.

Sensitivity: Local government operations of sewage treatment and solid/hazardous waste disposal facilities can create opportunities to combine these activities with residuals treatment and disposal.

Staffing: All options create the need for staffing to deal with facility maintenance and recordkeeping. Option 3 allows the staffing burden to fall on a single entity.

Coordination: Effective coordination of residuals management with other waste management activities can be accomplished through public ownership and operation. The precise strategy to follow will depend on local circumstances.

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[1] Single governmental entity is a county or municipality.

[2] Multigovernmental entity is a group of counties or municipalities.

[3] In this case, the single governmental entity can be a county, municipal, or state agency.

[4] Public refers to septage haulers employed by governmental agencies. Private refers to private haulers.

A frequently cited problem with the use of publicly-owned wastewater treatment plants which also handle septage and sludge wastes, is that the plant operator for local jurisdiction can, without warning, refuse to accept septage from a private hauler. Many plant operators are given the discretion (by the local governing body) to deny a hauler the right to dispose of septage because of the potential harm the septage load may have on the treatment plant. Municipal treatment plants, because of their size or treatment processes, sometimes cannot handle large volumes of septage, and septage handling facilities are not always available at the treatment plant site for the storage or pretreatment of the residual waste. State or regional (multicounty) ownership and management of residuals disposal facilities (options 2 and 3) may help to avoid potential intermunicipal conflicts, and further promote the monitoring of residual waste disposal activities within a large service area.

There are many localities that own and operate treatment plants and land disposal sites for the disposal of septage from on-site systems, while other municipalities administer hauling services. The following examples illustrate alternative arrangements.

PUBLIC OWNERSHIP AND OPERATION -- RESIDUALS DISPOSAL ILLUSTRATION

The Town of Acton, Massachusetts and Fairfax County, Virginia own and operate septage treatment facilities. Acton operates a lagoon which receives only septage, and Fairfax County operates two wastewater treatment plants that receive septage. In both cases, the use of the treatment facilities is restricted to the use of private haulers servicing residences within the town or county, respectively. In Acton, the hauler must purchase a coupon from the Town Clerk and present the coupon to the attendant at the treatment facility before he is allowed to dispose of the septage. In Fairfax County, color-coded decals are placed on the windshield of the hauler vehicles as proof of payment of an annual license fee which covers the costs of septage treatment.

Septage hauling and treatment services for community septic tank drain field systems in several counties in the State of Washington are provided by county departments of public works. Septage pumping is provided, along with system inspections and general maintenance services.

PUBLIC OWNERSHIP AND OPERATION -- RESIDUALS DISPOSAL ILLUSTRATION (CONTINUED)

Statewide participation in residuals disposal is found in Connecticut where facilities for materials recovery, conservation, and disposal are being established on a regional basis. Septage disposal is not currently being handled, but the state regional arrangement does offer promising opportunities.

Special Agency Ownership and Operation

A special single- or multipurpose agency can be created to provide residuals treatment and disposal facilities (see Table 46). Special purpose agencies can assume a variety of forms, including special districts, public authorities, or utilities. The service area of a special purpose agency for residuals management purposes can consist of contiguous or noncontiguous communities or parts of communities.

Many sewer authorities provide special septage handling facilities at their conventional wastewater treatment facilities. One such agency is the Seattle, Washington METRO agency.

SPECIAL AGENCY OWNERSHIP AND OPERATION -- RESIDUALS DISPOSAL ILLUSTRATION

The Seattle METRO (a public authority) has installed a controlled access disposal site at its wastewater treatment facility which automatically records the amount of septage being discharged. The driver of the incoming septage truck inserts a special magnetic card into the gate control and recording device. The card contains a vehicle identification number, and the volume of septage disposed of at the facility, as well as the time of disposal, is made available to the plant operator.

Through its areawide water quality management program, the Seattle METRO is currently studying the feasibility of establishing on-site/septage management programs for its member counties.

TABLE 46. SPECIAL AGENCY OWNERSHIP AND OPERATION -- RESIDUALS DISPOSAL

Description: Special agencies are autonomous units of local government that can own and operate residuals disposal facilities.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

	Option 1	Option 2
Operational Performance Standards	State or local	State
Facility Ownership	Special purpose agency	Special purpose agency
Facility Service Area	Single governmental area	Multigovernmental area
Facility Operation	Special purpose agency	Special purpose agency
Residuals Transport	Public/private	Public/private

EVALUATION:

Responsiveness:	Agency board of directors is the governing body. Members can be elected by service area residents or appointed by the local governing body.
Enforcement:	Special purpose agencies have flexible and broad regulatory powers.
Sensitivity:	Economies of scale can be achieved through regional service areas made up of groups of local municipalities.
Staffing:	Special purpose agencies can maintain their own staff in performing maintenance duties.
Coordination:	Integration between wastewater, solid waste, and hazardous waste management and residuals disposal can be achieved through multipurpose special agencies.

Private Ownership and Operation

Private companies also own and manage septage and sludge disposal facilities for use by public and private haulers (see Table 47). Typically, privately-owned facilities are land disposal sites owned or leased from a private landowner, for the use of a single private hauler or hauling company. The location of the disposal site, therefore, depends on the availability of land to the private company or the willingness of a private landowner to allow land disposal (in areas where regulations allow land disposal).

Private ownership and management can be an attractive alternative, especially when a group of localities fail to cooperate in residuals management activities. Privately-owned disposal sites can be established for the use of private haulers in servicing individual residences on an as needed basis or by communities (or on-site management programs) on a contract basis. For example, a single community or group of communities can contract with a private company for residuals disposal services. The private company could contract directly with the community (or on-site management program) for a specified period of time.

PRIVATE OWNERSHIP AND OPERATION -- RESIDUALS DISPOSAL

Residuals disposal at privately-owned sites is common in almost every state. Because of the shortage of accessible and reliable public treatment facilities in most areas, private haulers are left with the responsibility of finding adequate disposal sites. Many haulers find this to be a frustrating burden and often refuse to handle wastes in localities that do not provide septage disposal sites. Septage management studies performed in New Hampshire and Vermont, for example, point out that many towns do not meet state legislation that requires each town to make arrangements for adequate septage disposal.

Private company-owned and operated residuals disposal facilities could be as small as a farmland parcel used by a single hauler, a treatment plant for septage treatment, or combined wastewater/septage treatment. General Development Utilities in South Florida is an example of a private utility that owns and operates several wastewater treatment plants and also has several hauling vehicles to pump septic tanks for their septic tank effluent pump (STEP) system.

TABLE 47. PRIVATE OWNERSHIP AND OPERATION -- RESIDUALS DISPOSAL

Description: The private ownership of residuals waste facilities is a common strategy for dealing with the disposal of septage.

MANAGEMENT FUNCTIONS -- INSTITUTIONAL ARRANGEMENTS:

	Option 1	Option 2
Operational Performance Standards	State or local	State or local
Facility Ownership	Private	Private
Facility Service Area	_[1]	Contract or franchise area
Facility Operation	Private	Private
Residuals Transport	Private	Private

EVALUATION:

Responsiveness:	Private firms tend to be responsive to customer needs.
Enforcement:	State and/or local agencies are typically charged with inspecting and approving disposal sites owned and operated by private haulers.
Sensitivity:	Private firms tend to locate disposal sites to serve the disposal needs of their individual firm. The location of disposal sites generally has little relation to septage generation rates, other than through the minimization of transportation costs.
Staffing:	Private firms usually are more efficient in terms of staffing size and efficiency.
Coordination:	Local governments can set up franchise areas or contract residual waste handling and disposal services with private firms. Contracting with private companies reduces the burden on local government to acquire disposal sites or transportation equipment.

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[1] Service area consists of individual homeowners who contract with private haulers.

CHAPTER 5

FORMULATING A FINANCIAL PLAN

Financing a wastewater system involves securing grants and loans to cover capital expenditures, and collecting revenues to support annual debt service and operating costs. Although it has historically been very difficult to obtain Federal construction grant funding for projects serving small communities, recent legislation (PL 95-217) has made more funding available. It is important to recognize that the community must be able to support its local share of the costs, which include nonfundable capital expenditures, and annual operating costs. This cannot be overemphasized in planning wastewater systems, especially for rural small communities with limited financial resources.

Generating sufficient revenues to cover debt service and operating costs is essential for any management program to remain viable. This can be done through many different mechanisms ranging from permit fees to service charges. The method of collecting revenues will largely depend on the type of wastewater system being managed, although any number of methods might be employed to finance the various elements of a management program. No matter what kind of wastewater facilities are involved, it can be difficult to equitably allocate the cost of a system among individual users.

This chapter discusses various methods of financing capital costs and generating revenues as they apply in developing a financial plan. The discussion will emphasize the importance of proper financial planning, and will illustrate different institutional arrangements for implementing such plans. Key financial management topics are addressed in this chapter, including:

1. Ownership - maintenance liability of wastewater systems.

2. Distribution of costs among user classifications.

3. Methods of collecting user fees.

4. Procedures for estimating manpower requirements and costs associated with technical plan recommendations.

The financial plan addresses who will pay for new wastewater management services, how much they will pay, and when. These financing issues are discussed in later sections of the chapter with regard to:

1. On-site systems.
2. Small community systems.
3. Septage disposal.

Associated institutional and technical considerations that local agencies and service area residents should address prior to (and in conjunction with) formulating a financial plan include:

1. What types of wastewater systems are to be applied, and what areas will they serve?

2. Who will design and install new wastewater systems?

3. Who will operate and maintain these facilities?

4. Who will repair and replace failing equipment?

The financial plan will identify the roles and responsibilities of participating entities in carrying out management functions, as determined in the operations plan (Chapter 4). More importantly, the financial plan specifies how the financing of the project will be handled.

Users of this report should review EPA reports developed through the Financial Management Assistance Program (FMAP) for additional guidance on financial issues and financing strategies. These reports are available from EPA regional offices and from the Water Planning Division of the Office of Water Program Operations in Washington, D.C.

GUIDE FOR FINANCIAL PLAN FORMULATION

A major concern in preparing a financial plan is defining the manner in which the local share of the total project costs is to be allocated among potential users. This section of the chapter outlines a series of analysis steps to be followed in developing an equitable financing approach. After initial cost estimates are made for comparing technical alternatives and overall financial impact of the project, the subsequent financial analysis of the selected plan should include the following steps:

Step 1 -- Determine capital cost requirements and funding availability.

Step 2 -- Estimate future annual operating costs.

Step 3 -- Calculate average user costs and review cost allocation methods.

Step 4 -- Develop user cost collection mechanisms.

Step 5 -- Assess economic impacts of the financial plan on service area residents.

As listed above, the process of formulating a financial plan involves the estimation of capital costs, manpower requirements, labor and nonlabor costs, and finally, cost allocation mechanisms. This process can be a difficult and time-consuming endeavor, however, the acceptance of a wastewater management plan by a community can depend on the reasonableness of out-of-pocket costs. Creative financing is often necessary to address the complex equity issues that typically arise in planning for small wastewater systems.

Step 1: Determine capital cost requirements and funding availability.

The construction and upgrading of wastewater systems will involve an outlay of capital expenditures. Technical planning activities will define the technology to be applied and the associated capital cost requirements. In order to undertake such capital improvements, a management agency should be able to accept and utilize grants from various sources, incur debt, and raise revenue to cover the balance of costs not paid from grant funds (i.e., the local share of capital costs).

Table 48 lists the major issues associated with financing capital costs for small wastewater facilities. These issues include:

1. Assessing funding availability and eligibility rules.

2. Determination of local share of capital costs and debt service estimates.

3. Evaluation of management agency capabilities to finance wastewater system capital costs.

Table 49 lists the major wastewater system cost items and presents a method for calculating the local share of capital costs. Information prepared in this table will be used with subsequent calculations in deriving an estimate of annual costs to users.

A discussion on financing the local share of capital costs is contained in Step 3.

Step 2: Estimate future annual operating costs for the project.

Generally, Federal and state sources of grants for wastewater treatment facilities will not pay for operating expenses. These costs are reserved for the residents being served by the project. Estimating the annual operating costs for the project involves:

1. Assessing the administrative and maintenance requirements for the chosen wastewater technology (from the operations plan).

2. Calculating manpower requirements for system operation and maintenance and program administration based on the number of systems to be served, the frequency of service, and the services to be performed by the managing entity.

3. Calculating other costs supporting direct manpower activities.

4. Translating manpower requirements into salaries and estimated total annual costs.

Most of the information required for these calculations is available from the operation plan (Chapter 4).

Table 50 provides a format for identifying program staff requirements as a first step in calculating annual operating costs. The user can apply this table in estimating staff needs for a particular management approach. The outputs of this table (staff size and responsibilities) are used in calculating total operating expenses, as shown in Table 51. This table lists the major components of operating costs in a format that can be readily applied to cost estimating.

Figures 9 and 10 present approximations of total program costs for on-site and small community system management programs. The graphics display program costs according to service area size (as measured by the number of dwelling units served). These costs do not reflect annual debt service, septage pumping, or capital improvements, and reflect only the costs of program operation (as calculated in Table 51).

Impacts of economies of scale, as reflected through the use of a full-time or part-time staff, are also taken into account in these graphics. A more specific analysis of possible economies of scale in management approaches can be accomplished through the detailed manpower/functional analysis shown in Tables 50 and 51. By utilizing these tables, a closer approximation of the actual staff requirements (i.e., full-time or part-time staff) can be derived. Figures 9 and 10, on the other hand, have manpower assumptions incorporated into the derivation of the service area size/operating costs relationships. Costs for labor, however, were estimated on the basis of manpower requirements per system, not on actual staff requirements (which might result in less than full-time utilization of manpower). For illustrative purposes, the threshold levels for one full-time staff-person (to cover technical and administrative duties, other than clerical) are identified in these graphics.

The cost data that appear on Figures 9 and 10 are approximations, and are included to serve as a general guide for comparing gross program costs. The user should review the assumptions contained in the cost curves before applying them to a specific situation. Therefore, it is recommended that the procedure presented in Tables 50 and 51 should be utilized in preparing program cost estimates for facility planning purposes. (Figures 9 and 10 can be used to calculate preliminary estimates of program operating costs.)

Step 3: Calculate average user costs to cover local share of capital costs and annual operating costs. Identify funding allocation methods to be used to generate revenue.

Developing a financial plan for small wastewater systems management involves packaging a number of different financing techniques to suit the fiscal requirements and administrative capability of the local management entity.

The previous steps have generated the necessary information to begin developing an overall strategy for financing the wastewater management plan. This financial strategy should be flexible enough to adapt to rising costs, future system needs, and potential new funding opportunities. In addition, the strategy should be equitable to all users and generate sufficient revenue to cover annual costs. Data generated in this step can also be used to compare the financial impacts of management plan alternatives.

The calculation of an annual average user cost is a key step in the process of developing a financial plan. Table 52 presents a sample format for calculating total annual costs, utilizing the results of the calculations from Tables 49 and 51. The final calculation yields an estimate of the average user cost (i.e., the total cost of the management program divided by the total number of homes or properties served). This average cost does not necessarily represent the actual annual cost to the user, and it is not necessarily the most equitable means of allocating costs. It does, however, serve as an effective measure of the fiscal impact of alternative management plans on existing and future users.

Revenues to cover total program costs calculated in Table 52 can be generated through a variety of mechanisms described in Tables 53 and 54. The methods relate to the allocation of costs to users through service charges, property taxes, or user charges, and to different methods for financing the local share of capital expenditures. A more detailed discussion of these methods as they apply to financing on-site, small community, and residuals management programs can be found in the following sections in this chapter: "Institutional Options -- On-Site Systems," "Institutional Options -- Small Community Systems," and "Institutional Options -- Residuals Disposal."

Step 4: Develop mechanisms to collect user costs from service area residents.

An important concern in formulating a financial plan is for the management entity to assure that service charges and other fees assessed to the service area resident will be paid. The ability to collect user fees, however, is tied directly to several legal issues which must be addressed, such as:

1. Compelling the formation of a management agency by state or local governments.
2. Compelling individuals to participate in the management program, and connect to an off-site treatment and disposal system.
3. Gaining authority to enter onto private property to maintain these sytems.

It is necessary for a potential management entity to assure that it possesses sufficient authority to set and collect user costs to cover the program's annual operating and debt service expenses.

Table 55 presents several options that may be used to enforce the collection of user charges and compliance with management requirements. The management entity may be reluctant to impose some of these enforcement methods where the resident simply cannot afford the cost of system repair or replacement. It is, therefore, necessary that along with the power to incur debt, receive grants, and impose liens on property, the management entity should have the authority to issue low-interest loans for system replacement, to charge for work on an installment basis, or to accumulate a capital fund for future equipment replacement or repairs.

Step 5: Assess impacts of the financial plan and project on service area residents.

A final step in developing a financial plan is the assessment of fiscal impacts on the community residents; that is, can the community afford the project? The evaluation criteria to perform this assessment are shown in Table 56.

In some instances it may be necessary to perform a burden analysis of projected costs. This procedure will generate an estimate of the cost burden on the average household in the future under various assumptions about pricing policies, growth in new users, and inflation in operations and maintenance costs. For a complete discussion of the burden analysis methodology, see "Worksheets and Instructions for a Screening Procedure for Water Pollution Control Projects," Government Finance Research Center, Municipal Finance Officials Association (MFOA) and Peat, Marwick, Mitchell and Company, Washington, D.C., February 1979. This document and others addressing similar financial management issues have been developed by the Financial Management Assistance Program (FMAP). Information is available from EPA regional office and the Facilities Requirements Division of the Office of Water Program Operations in Washington, D.C.

TABLE 48. PROCEDURE FOR ASSESSING CAPITAL COST REQUIREMENTS FOR MANAGEMENT AGENCIES

Assessment of Funding Availability and Eligibility Rules

- Identify Federal and state funding programs (grants and loans) which may be applicable. (A brief discussion of Federal funding programs for wastewater treatment facilities appears in Chapter 3, in the subsection "Institutional Options.")
- Contact Federal and state agency personnel responsible for applicable Construction Grant Programs to assess funding availability, eligibility requirements, and application procedures.
- List available sources of grants and loans and compile eligibility rules to fund various capital cost components.

Determine Local Share of Capital Costs

- Obtain cost estimates for wastewater collection and treatment facility construction costs, plus costs for land, easements, engineering fees, legal fees, etc. (Include estimates of initial capital costs, facility expansion and replacement costs.)
- Calculate local share by subtracting grants from total capital costs, based on eligibility rules. (See Table 49 for sample calculation procedure.)
- Check enabling legislation and charters to determine whether management agencies can accept grants from Federal and state agencies. (See Table 18.)
- Check enabling legislation and charters to determine methods of financing the local share of capital costs of different institutional arrangements (see Table 18).

TABLE 49. PROCEDURE FOR CALCULATING LOCAL SHARE OF CAPITAL COSTS

System Components	Total Cost	EPA Grant Share[1]	
		Eligible	Ineligible
1. Total Construction Cost of Proposed Facilities			
Initial capital investment			
a. Collection lines	______		
b. Interceptor (trunk) lines	______		
c. Residuals treatment/disposal facility	______		
d. On-site treatment/disposal facilities	______		
e. Pumping units and pump stations	______		
f. House connections	______		
g. Land purchase + options	______		
h. Rights-of-way acquisition	______		
i. Residuals hauling vehicles and equipment	______		
Construction Cost Summary			
j. Total cost (1a through 1i)			
k. Total eligible cost			
l. Total ineligible cost			
2. Engineering and Legal Fees			
a. Engineering costs (for system design)	______		
b. Legal fees (for rights-of-way acquisition, developing charters and ordinances, etc.)	______		
c. Total cost (2a + 2b)			
3. Expenditures Anticipated During Planning Period			
a. Equipment replacement	______		
b. Cluster system upgrading/expansion	______		
c. Rehabilitation of individual systems	______		
d. Purchase of miscellaneous equipment	______		
e. Total expenditures	______		
4. Capital Cost Analysis for Proposed Project			
a. Total construction cost of proposed facilities (1j)	______		
b. Total engineering and legal fees (2c)	______		
c. Costs eligible for EPA Construction Grant funds (4a+4b)	______		
d. EPA share (at ___%)	______		
e. State share (at ___%) (if applicable)	______		
f. Local share of costs (4a+4b-4d-4e)	______		
g. Local share of costs (1l+3e)	______		
k. Total local share (4f+4g)			
l. Total *annual* local share of capital costs.[3]			

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[1] Calculate eligible costs based on EPA Construction Grants and state matching share. Indicate grant share as a percent of eligible costs.

[2] Identify other Federal or state funding programs and check for eligibility rules.

[3] Use a 20-year planning period for a loan or bond maturity at the estimated rate of interest for this initial calculation. The precise method of financing the local share is discussed in Step 3.

TABLE 50. ESTIMATING PROGRAM STAFF REQUIREMENTS

Function	Implementing Entity[1]	Assumptions and Calculations[2]	Annual Work Day Requirements[3]
New Installations			
• Site evaluation			
• Design review			
• Installation supervision			
• Permit issuance			
System Maintenance			
• Routine maintenance (inspections)			
• Emergency maintenance (service calls)			
• Customer relations			
• Permit renewals		SAMPLE FORMAT	
System Repair/Replacement			
• Failed system inspection			
• Installation supervision/ performance			
• Violation notices			
• Permit renewals			
Residuals Disposal			
• Pumping			
• Treatment and disposal			
Monitoring			
• Surface-water quality			
• Groundwater quality			
• Wastewater discharge			
• Special systems monitoring			
Administration/Planning/Financing			
• Office administration			
• Compliance reporting			
• Financial management			
• Bookkeeping			
• Billing and accounting			
• Public relations/education			
• Program coordination			
• Maintenance recordkeeping			

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[1] As identified in the operations plan.

[2] Determine frequency and number of visits and time involved in performing various functions.

[3] Indicate staff category, e.g., managerial, technical, clerical (see Table 51).

TABLE 51. CALCULATION OF OPERATING COSTS

	(A) Annual Salary	(B) Adjusted Salary[1]	
Labor			
Program manager	$		
Assistant manager	$		
Professional staff	$		
Field crews, technicians, operators	$		
Clerical/bookkeeping staff	$		
Total salary costs (from column B)		$	
Insurance and benefits (___% of total salary costs)		$	
Total labor costs			$
Nonlabor			
Treatment system	$		
Utilities, chemicals, etc.	$		
Vehicle maintenance	$		
Miscellaneous equipment, tools, etc.	$		
Replacement parts, etc.	$		
Treatment service charges	$		
Residuals disposal charges	$		
Private contractor service charges	$		
Testing equipment	$	SAMPLE FORMAT	
Laboratory analysis	$		
Office expenses (rent, postage, supplies, utilities, etc.)	$		
Staff training	$		
Training courses, seminars, etc.	$		
Consultant services	$		
Legal/accountant services	$		
Taxes	$		
Insurance (on equipment)	$		
Miscellaneous expense (e.g., mileage)	$		
Total nonlabor costs			$
Total operating costs			$

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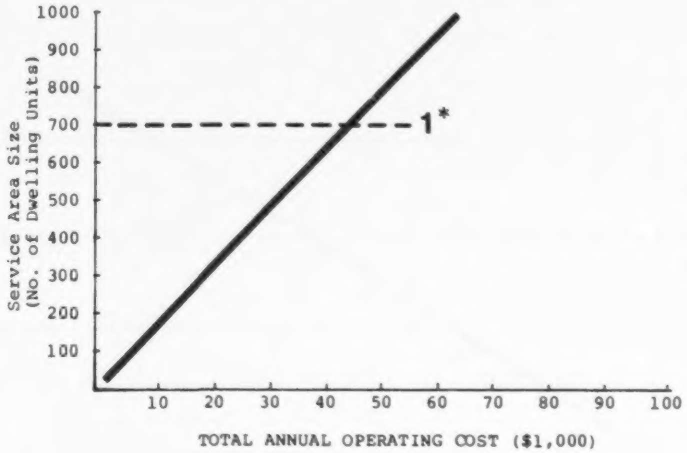
[1] Adjusted salary (column B) = average annual salary (column A) $\times \dfrac{\text{total man-days required}}{\text{total man-days in one man-year}}$ (Table 50)



*Number of full-time staffpersons to cover technical and administrative duties (except clerical).

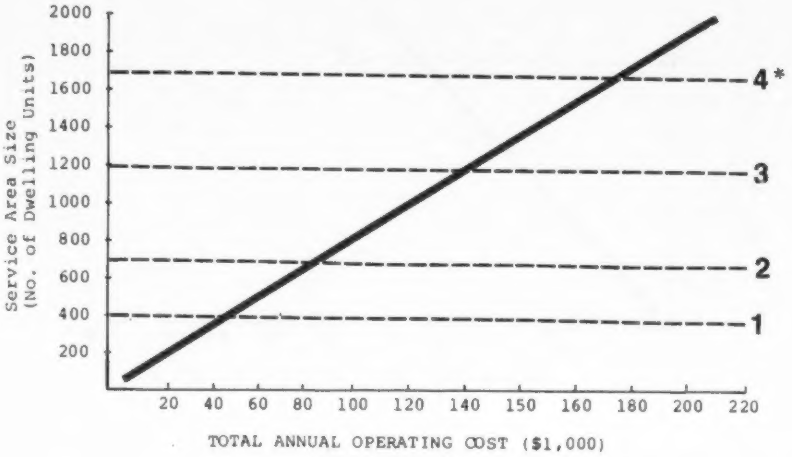
ASSUMPTIONS

Assuming individual standard septic systems on a regular maintenance program with homeowner responsible for system repairs and septic tank pumping.

1. New installations -- Slow growth rate (1% annual growth) with time devoted to design review, inspection, and permit administration.
2. Operation and maintenance -- Septic systems inspected once every three years at one-half workday per inspection. Two percent annual failure rate assumed. Time for design review, inspection, and permit administration for repair systems is included.
3. Septage disposal -- Average tank pumping frequency is once every five years. Pumping costs are not incorporated into the estimates. Administration of recordkeeping program is included.
4. Monitoring -- Quarterly sampling program is assumed for surface and groundwater quality analysis.
5. Staffing -- Technician salary is $45/workday ($12,000/work year), manager's salary is $70/workday ($18,000/work year), clerical salary is $35/workday ($9,000/work year). All salaries include fringe benefits.
6. Nonlabor costs -- Total nonlabor cost (e.g., office space, utilities, vehicle costs, supplies, etc.) is equal to labor costs.
7. Operating cost -- This does not include debt service for initial system rehabilitation, or the cost of future system repairs.

The cost curve is intended to illustrate the general relationship between operating costs and service area size. The information derived can be used to calculate order of magnitude preliminary operating cost estimates. This information, however, is not intended to serve as a substitute for the more detailed cost-estimating procedure presented in Tables 49, 50, and 51.

Figure 9. Typical relationship between operating cost and service area size for conventional on-site systems.



*Number of full-time staffpersons to cover technical and administrative duties (except clerical).

ASSUMPTIONS

Assuming small diameter pressure sewer system with individual grinder pumps (one pumping unit per household), and aerated lagoon treatment facility with surface discharge.

1. New installations -- Slow-moderate growth rate (3% annual) for future connections.

2. Operation/maintenance -- Each pump unit inspected once every two years for preventive maintenance and service at one-half workday per inspection. Collection line and treatment facility maintenance also included. Maintenance costs were adjusted by facility and service area size.

3. Staffing -- Technician (plant operator/inspector) salary of $55/workday ($14,400/work year), manager at $70/workday ($18,000/work year), and clerical at $35/workday ($9,000/work year), including fringe benefits.

4. Nonlabor costs -- Costs for office expenses, vehicle costs, and equipment are one and one-half times the labor costs.

5. Operating costs -- This does not include debt service for initial capital improvements, pump replacement costs, and cost of purchasing and installing pump units for future connections.

The cost curve is intended to illustrate the general relationship between operating costs and service area size. The information derived can be used to calculate order of magnitude preliminary operating cost estimates. This information, however, is not intended to serve as a substitute for the more detailed cost-estimating procedure presented in Tables 49, 50, and 51.

Figure 10. Typical relationship between operating costs and service area size for small community systems

TABLE 52. CALCULATION OF AVERAGE ANNUAL PROGRAM COSTS TO USERS

Total Local Share of Capital Costs (Table 49) .... ______
(Excluding all grants)

Total Labor and Nonlabor Operating Costs (Table 51) .... ______

Total Annual Costs .... ______
(Local share, plus operating costs)

Total Number of Users .... ______
(Specify number of existing homes or developable properties to be served)

Average Annual User Cost[1] .... ______
(Divide total annual cost by number of users)

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[1] The calculation of this cost assures that the final user cost includes all direct and indirect costs of supporting the wastewater management program. Thus, the program is self-sustaining on the basis of annual revenues generated. The average annual user cost can then be translated into an actual annual charge through the application of the alternative financing and cost allocation methods presented in Tables 53 and 54.

TABLE 53. METHODS FOR FINANCING LOCAL SHARE

Mechanism	Description	Advantages	Disadvantages
Loans	Loans can be obtained from Federal and state sources for system construction. Loans are also available from commercial lending institutions. Loan programs can be established by states or local governments to assist homeowners in repairing failing systems.	Generally, state and Federal agencies can issue low interest loans with long-term paybacks.	Lending agency may require certain provisions (e.g., power to levy taxes) to assure managing agency ability to retire the debt. Commercial loans will generally be available at a higher interest rate.
General Obligation Bonds	Bonds backed by the full faith and credit of the issuing entity. Secured by the taxing powers of the issuing entity.	Commonly used by local governments. Interest rates are usually lower than other bonds. Offers considerable flexibility to local governments.	Community debt limitations may restrict their use. If property taxes are used to retire debt, costs may not necessarily be paid for solely by the project beneficiaries.
Revenue Bonds	Bonds retired by the revenue of the facility.	Can be used to circumvent local debt limitations. Popular alternative to G.O. bonds.	Do not have the full faith and credit of local government. Typically higher interest rate than G.O. bonds.
Special Assessment Bond	Bonds payable only from collection of special assessments (e.g., front footage assessment); not from property taxes.	Removes financial burden from local government. Useful when direct benefits are easily identified.	Can be costly to individual landowners (especially large lots). May be inappropriate in several areas due to nonuniform lot sizes. May have higher interest rate.
Special Benefit Assessment	Direct fees or taxes on the property. Sometimes referred to as an improvement fee.	Useful where benefits to properties from capital improvements are identifiable. Can be used to reduce local share debt requirements for financing. Also can be used to establish a fund for future capital investments.	Initial lump sum payment of assessment may be a significant burden on individual residents.
Connection Fee	Levied at the time a user connects to the wastewater system (not considered a tax or benefit assessment). Can be divided into two or more one-time payments to reduce initial burden on homeowner.	Often used to recover actual costs for connection to the system. A unique application is in raising the local capital share of system upgrading and replacement often found in on-site management programs.	Initial lump sum payment of assessment may be a significant burden on individual residents.
Reserve Fund	A part of utility revenue is placed in a separate fund each year, and invested in order to accumulate adequate funds to finance capital improvements.	Avoids the expense of borrowing. Can be used to finance future system repairs that are not eligible for initial grants.	Account is based solely on system revenues. Poor management of the fund can lead to default.
Ad Valorem	Tax computed on the assessed valuation of all property within the jurisdiction of the issuing entity.	Spreads the costs of the project to all taxpayers on a uniform basis. Administrative cost to collect taxes can be low, if taxes are low. Eligible tax deduction for the homeowner.	Has potential to spread costs to properties not benefitting from the project. Review Federal regulations before using property tax financing methods when Federal grants are involved. (CFR 40, Part 55, Subpart E, 1 October 1978).

TABLE 54. ALTERNATIVE COST ALLOCATION TECHNIQUES

Mechanism	Description	Remarks
Service Fee	Charges levied at the time a specific service is performed. Commonly used to cover administrative costs of design/installation, operation and maintenance, and residuals disposal. It is a flexible tool, with both uniform and variable rate structures.	Can be levied as a uniform rate for: ● Inspections ● Septage pumping ● System repairs or replacement (e.g., for pumping units) ● Visits for site evaluation or problem diagnosis ● Design reviews, recordkeeping, and permit issuance Variable rates with each activity could be levied to account for: ● Monitoring/inspection requirements for wastewater systems. ● Travel time for visitation ● Length of service time ● Type of wastewater system ● Other user classifications (See User Charge remarks)
Property Taxes	Financing total management program cost through general property tax rates. Eliminates the need for separate service charges.	Can be calculated as average increase in property tax millage rate by dividing annual program costs by average tax assessment value per property.
User Charge	Monthly or annual fee set to cover amortization costs, operation and maintenance costs, equipment repair or replacement. The fee structure could consist of an annual service fee (for O&M expenses), special assessments and connection charges for recovering capital costs (See Table 52). Can be a fixed or variable rate depending on the precise cost-sharing mechanism chosen (see Remarks).	Alternative allocation methods include uniform rates or variable rates, based on: ● Residential/commercial/industrial users ● Permanent residents/seasonal residents ● Existing residents/future residents ● Low or fixed-income residents ● Active income producers ● Users with conventional systems/users with experimental or nonconventional systems ● Age or operating condition of the system (when existing septic systems are involved).

TABLE 55. ALTERNATIVE USER COST COLLECTION METHODS

Collection Method	Description	Advantages	Disadvantages
Liens on Property	Local governing entity (with taxing powers) may add the costs of performing a service or past unpaid bills as a tax on the property.	Has serious enforcement ramification and in worst instances, is enforceable.	Local government may be reluctant to apply this approach, unless the amount owed is substantial.
Recording Violations on Property Deed	Copies of violations, can, through administrative or legislature requirement, be attached to the property title (via registrar of deeds).	Relatively simple procedure. Can effectively limit transfer of property ownership.	Can be applied to enforce sanitary code violations; may be difficult to apply in collecting unpaid bills.
Presale Inspections	Conducting inspections of on-site wastewater system equipment prior to transfer of property ownership.	As a variation of above procedure, notice of violation may be given to potential buyer at the time of systems inspection.	May be difficult to implement due to legal restrictions.
Termination of Public Services	A customer's water, electric, or gas service may be terminated.	Effective procedure, especially if management entity is responsible for water supply.	Difficulty rests with the possible health impacts in terminating public services, and with the logistics of terminating water supply where private wells are used.
Fines	Monetary penalties for each day of violation, or as a surcharge on unpaid bills.	Fines can be levied through local judicial system as a result of enforcement of violations.	Effectiveness will depend on the authority vested in the entity issuing the fine.

TABLE 56. EVALUATION CRITERIA FOR FINANCIAL PLAN FORMULATION

Administrative/Legal Feasibility

- Availability of grant assistance.
- Ability to obtain maximum grant assistance.
- Ability of management agency to act independent of budget constraints.
- Ability of management agency to attract and maintain professional and nonprofessional staffing.
- Ability of management agency to raise revenue, through various sources:
    - Assessments.
    - Permit fees.
    - User charges.
    - Inspection fees.
    - Connection fees.
    - Other methods.

Fiscal Feasibility

- Ability of users to pay for system capital debt service, operation and maintenance, rehabilitation, or replacement.
- Relative cost of alternative management programs (type of agency, public/private relationships, scope of service).
- Distribution of costs to various user groups (existing vs. future users, permanent vs. seasonal residents, etc.).
- Impact of management programs on:
    - Present and future local community budgets.
    - Provision of other public services.

INSTITUTIONAL OPTIONS FOR FINANCING ON-SITE SYSTEMS

Financing the various aspects of an on-site management program (i.e., system design, inspection, operation and maintenance) can be handled in several different ways. Three basic approaches, as shown in Table 54, include:

1. Service fees paid by the property owner to the managing entity for specific services related to regulating the design, installation, and maintenance of individual systems.
2. Property taxes levied on all property owners within the management entity's jurisdiction.
3. Monthly or annual user charges billed to property owners to cover the costs of the management program.

As noted in the introduction to this chapter, developing a financial plan for a wastewater management program will require inputs from other phases of the planning process, particularly the preparation of the operations plan, to address the following issues:

1. Who is the management agency?
2. Which residents are benefitting from management services?
3. How often will management services be required?
4. What is the structure of the management program; what functions will it provide?

Table 57 presents a set of generic institutional options for carrying out various on-site management functions. More precise definitions of institutional arrangements would be developed in the operations plan. The generic institutional options here serve to illustrate various management agency/homeowner relationships that affect the structure of the financing system. As shown in the table, an agency can assume some or all functions associated with on-site systems management.

In option 1, the selected management agency assumes limited system design and maintenance functions. A financing strategy would therefore be relatively simple to develop and administer, since the management agency would only have to be compensated

TABLE 57. ABBREVIATED INSTITUTIONAL OPTIONS FOR ON-SITE MANAGEMENT

Function	Option 1	Option 2
Design/Installation		
Site evaluation	Property owner/contractor	Management agency
System design	Property owner/contractor	Property owner or management agency[1]
Design review	Management agency	Management agency
Permit issuance	Management agency	Management agency
System installation	Property owner/contractor	Property owner or management agency[1]
Recordkeeping	Management agency	Management agency
Operation and Maintenance		
Routine maintenance	Property owner/contractor	Property owner or management agency[1]
Correction of failing systems	Property owner/contractor	Property owner or management agency[1]
Monitoring	Management agency	Management agency[1]
System ownership	Property owner	Property owner or management agency[1]

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[1] The management agency can provide these services through an agreement with a private contractor or through its own staff.

for the costs involved in reviewing system designs, issuing permits, and monitoring compliance with permit conditions. Program costs are typically raised through the general fund, permit fees, or other types of special assessments.

For option 2, on the other hand, a financing mechanism would be established to provide a method of raising revenues to cover system maintenance activities such as inspections and correction of failing systems. The system inspections could be provided by the management entity and paid by the property owner on a service fee basis, or the inspection service could be included (along with other management activities) as part of an annual payment to the management agency.

The management agency in option 2 could also assume responsibility for repairing or replacing septic systems. The management agency can set up a reserve fund that each property owner would pay into. If a wastewater system fails, the costs to repair or replace it is paid from the reserve fund. (This is similar in concept to an insurance program.) The reserve fund can be a completely separate fund or included as part of an annual payment that is designed to cover other management program costs.

The concept of a reserve fund to repair or replace failing septic systems has the distinct advantage of protecting the property owner from high, unplanned expenses for septic system replacement. This provision also gives the property owner an incentive to correct septic system problems without delay or financial worry.

The disadvantages of this concept rest with the potential for removing property owner incentives to properly care for the septic system. The likely attitude of the property owner may be to shift complete responsibility for septic system maintenance and performance to the management agency, which is collecting an annual payment for septic system services. The property owner, therefore, assumes no responsibility or liability for system performance. Another problem with the reserve fund approach is the difficulty of administering it in an area with existing septic systems. Inspections would be required to determine the operating condition of each septic system before a property owner to determine eligibility in the program.

Issues such as property owner attitude and equity in user rates should be evaluated before a financing mechanism is selected. Several examples of financing approaches applied in various on-site system management programs follow.

ON-SITE SYSTEMS FINANCING ILLUSTRATION

A typical fee for processing an on-site system permit application ranges from less than $50 to over $200. The on-site specialists in Vermont, for example, charge $50 per lot to perform site evaluations, prepare system designs, and supervise system installation. In Marin County, California, the County Public Works Department has a $200 per lot permit application fee which covers the cost of plan review and installation supervision. (The county does not perform extensive site evaluations in each lot application.)

Vermont appropriations to the on-site specialists program have helped keep the costs to a reasonable level and attractive to home builders in this rural state. Program directors estimate that the $50 permit fee only covers half the cost of the program administration.

The Pennsylvania Department of Environmental Resources supports half the costs of the Sewage Enforcement Officer (SEO), a certified representative of the state who administers the state code. The other half of the SEO's salary is provided by a local unit of government (primarily townships), which uses permit application fees as a means of raising the local matching share.

The financial structure of the Fairfax County, Virginia, Health Department illustrates an alternative financing arrangement for local regulatory programs. The State Health Department pays the salaries of the county sanitarians, plan reviewers, and field personnel, which support about half of the county budget for this program. The remainder of the costs are covered by the County General Fund, and permit fees are collected to raise part of the county's revenue share. (The permit fee for an on-site system in the county is $65 per lot.)

The financing methods used in the Georgetown Divide Public Utility District (GDPUD) in El Dorado County, California, and the Stinson Beach County Water District (SBCWD) in Marin County, California, illustrate the use of user charges to support on-site systems management programs. Both programs provide for the review of proposed new system design and the inspection of operating systems.

ON-SITE SYSTEMS FINANCING ILLUSTRATION ILLUSTRATION (CONTINUED)

In the GDPUD, an annual service charge of about $15 is assessed toward every lot in the service area. The service charge is collected bi-monthly with the water bills. A special assessment of $50 is paid by the developer once a home is sold. This fee is used to conduct wastewater facility studies within the service area. A $10 permit fee is charged to each on-site system applicant. The developer is also assisting the GDPUD by a special site evaluation study (conducted with CETA help).

The Stinson Beach County Water District (SBCWD) charges a permit fee of $104 per year. The permit fee is levied only to developed lots within the service area (unlike the GDPUD approach). Billings are done on a quarterly basis in conjunction with water bills. Water service termination can be used by the SBCWD to enforce its regulations.

The SBCWD has received a two-year demonstration grant from the State Water Resources Control Board to subsidize a portion of the operation and maintenance expense. The state has also provided SBCWD with funds for a $100,000 revolving loan account for homeowners (with low income) whose systems need repair or replacement.

In recognition of the problems regulatory agencies face in requiring a homeowner to repair or replace a failing on-site system, the State of Wisconsin has set up a special revolving loan fund (of $1 million) to provide funds to residents (via county regulatory agencies) for individual system repair and replacement. This program, in addition to the SBCWD revolving fund, is one of the few examples of financing incentives for individual system rehabilitation and repair.

INSTITUTIONAL OPTIONS FOR FINANCING SMALL COMMUNITY SYSTEMS

There are various approaches to financing the capital expenses and operating costs for small community systems, as presented in Tables 53 and 54. They are:

1. Service fees and charges to raise funds for capital and operation cost recovery.

2. Special benefit assessments or connection charges to cover initial capital expenses.

3. Reserve funds (such as a sinking fund) for future capital improvements.

4. Debt financing through loans and the issuance of bonds for capital cost recovery.

The choice of the precise financing arrangement will again depend on the management agency structure, and the assignment of ownership-operational responsibility. As described in Chapter 4, "Formulating an Operations Plan," there are several options available for owning and operating the collection and treatment systems. These systems can be owned, built, and operated by a single management entity, or by different entities. For gravity sewers, the ownership of the collector lines has traditionally extended to the private property line, and the cost of connecting to the street collector line was the responsibility of the property owner. For some forms of small community systems, particularly where STEP, grinder pump, vacuum or other pumping units are connected to a common pressure line, a wide variety of ownership/maintenance responsibilities can be established.

These alternative arrangements, with their associated financing implications, are outlined as follows:

1. The management entity would design, build, and operate the entire collection system (including the individual units) and treatment-disposal facilities. A financing mechanism would be established to cover amortization and operating costs.

2. The management agency would design and maintain the system. The property owner would purchase the unit from the management agency (via connection fees), and install it to agency specifications. The management agency would establish a

financing strategy that would cover debt service and operation and maintenance (including equipment replacement) for the entire system.

3. The unit would be designed and purchased by the management agency, then repurchased by the property owner. The property owner would then install and maintain the unit through special service contracts with private firms. Costs for system repair and replacement would also rest with the property owner.

4. The unit would be designed and built by the management agency, but maintenance and repair of the unit would rest with the property owner.

5. The unit may be owned, installed, and operated by the management agency, but would be purchased by the property owner (via connection fees).

Each option treats the individual residences equally. Together they offer considerable flexibility in allocating costs to individual homeowners. They also provide methods for reducing the local share of capital costs and operating expenses to the management agency. In the first two options, for example, the management agency can establish a uniform annual payment to cover its program commitments, or it may utilize an annual charge plus a service fee for mandatory inspections.

The socioeconomic characteristics of users should be considered in establishing a financing mechanism to reduce potential adverse economic impacts among various classes of users (see Table 54). Two examples of small community system financing programs are given here.

SMALL COMMUNITY FINANCING ILLUSTRATION

The Lake Meade Municipal Authority (LMMA), Lake Meade, Pennsylvania, has instituted a typical user charge system which relies on an annual service charge, connection charges, and special assessments to finance their small community system. The local share of the construction funds (about $600,000) for the grinder pump/pressure sewer system and treatment plant were

SMALL COMMUNITY FINANCING ILLUSTRATION (CONTINUED)

raised by issuing a special assessment ($950 per home) and a connection charge ($1,750 per home). The assessment was designed to reflect the improvement in property values in the community due to the provision of a sewerage system. The connection fee represents the cost of installing the grinder pump/pressure sewer connection to the individual home. A $268 sewer rental fee (service fee) to cover operation and maintenance is charged each homeowner connected to the system. The LMMA has the power to terminate wastewater service if homeowners are delinquent in making payments. The LMMA also owns the pumps, pressure lines, and the treatment plant.

The General Development Utilities (GDU) owns and operates a septic tank effluent pump (STEP) pressure sewer system serving a small portion of its service area in southern Florida. The monthly charge (of about $8.00) and connection charge ($700 per home) is the same for residents in the STEP system as it is for residents served by conventional gravity sewer systems. This method of assessing charges facilitates the billing procedures, but does not reflect the actual cost of servicing the residence or the pressure sewer system. GPU personnel are currently evaluating this service charge method and are considering a separate billing schedule for residents on the STEP system.

INSTITUTIONAL OPTIONS FOR FINANCING RESIDUALS DISPOSAL

The costs for transporting, treating, and disposing of residual wastes (e.g., septage) can be raised through service charges (corresponding to a pumping and treatment event), general property tax revenues, or annual payments (on a pro-rated basis). The selection of the appropriate financing arrangement will depend on:

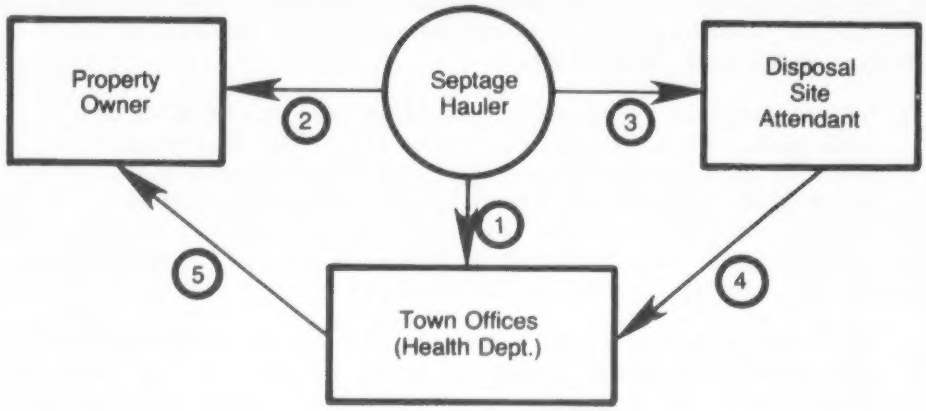
1. Who owns and operates the transport vehicles.
2. Who owns and operates the treatment and disposal facility.
3. Whether septage pumping is mandatory (i.e., within a formalized on-site system management program) or voluntary (i.e., at the homeowner's discretion).

As discussed in Chapter 4 ("Institutional Options -- Residuals Disposal" section), septage transport vehicles can be owned and operated by either a public management entity or a private contractor. Septage treatment and disposal facilities can be similarly owned and operated by a public management entity or private contractor.

Financing arrangements for privately-owned transport and treatment facilities are relatively straightforward; costs for disposal site operation and residuals transport are funded through fees paid by those contracting for the services. These service fees, paid at the time of septage pumping, are normally set by the private contractor to cover capital investment and operating costs, and provide a profit.

Financing the costs of a publicly-owned septage facility and transport vehicles can be done in a number of ways. Special septage disposal facilities designed to treat or stabilize septage (so that it can be safely disposed of in a landfill) are eligible for EPA construction grants, as are septage hauling trucks. Financing the local share and operating costs of such facilities can be accomplished by using service fees, property taxes, and annual payments.

Several alternative financing scenarios for residual disposal transport and treatment facilities follow. Some of the alternatives involve the use of a manifest system (i.e., trip ticket arrangement), as illustrated in Figure 11. The first six scenarios describe situations where the treatment facility is publicly-owned; the final two scenarios involve the



NOTES:

1. Haulers purchase coupons (usually coupon booklets) from town offices (one coupon for each 500 gallons pumped). This entitles the hauler to dispose of septage at the town-owned disposal site at no extra cost.

2. Haulers pump septage from property owner on request. (The town's biennial pumping requirement is not actively enforced.) Property owner pays the hauler for pumping.

3. A trip ticket is filled out by the hauler in triplicate. Hauler gives one copy of the ticket to the disposal facility operator. The ticket shows the name of the pumper, the location of the septic tank pumped, the quantity pumped, and the date of pumping. One copy remains with the hauler, and the third with the property owner.

4. The disposal facility attendant submits daily receipts to the town offices, where daily and monthly log summaries are tabulated.

5. A copy of the trip ticket is placed in a file kept for each system installed or repaired in the town. This file contains: a copy of the original percolation tests results, the installation permit, copies of the system design drawings, an as-built drawing, any repair permits, correspondence concerning the system, and any septage pumping trip tickets. Files which collect a large number of trip tickets within a short period of time are noted as potential problems and visited by a Town Health Department Officer.

Figure 11. Septage management system for Acton, Massachusetts.

use of privately-owned and operated treatment facilities. In most of these scenarios, the hauler vehicle would be privately-owned and operated.

1. The costs of septage treatment are paid through the general fund (i.e., property tax revenues) of the management agency. Septage pumping is provided by public as well as private haulers. Every property owner within the jurisdiction would be offered one free or nominally-priced pumping during each specified period (e.g., 2 to 4 years).

2. The management agency would charge an annual fee to each homeowner with an on-site system to cover the costs of septage treatment (and possibly pumping if septage vehicles were publicly-owned or if a contractual agreement were established with a private hauler). The annual fee would be pro-rated on the basis of an average interval between pumping (e.g., every three years).

3. A manifest system is established to identify the origin of the waste and disposal site utilized. The property owner would purchase a ticket or coupon from the management agency to cover the costs of septage treatment at publicly-owned treatment facilities. The property owner would pay a hauler for the pumping and transport costs. The hauler could present the ticket at the disposal site.

4. Using a manifest system, the property owner would pay a hauler for pumping and transport. The management agency (i.e., owner and operator of the treatment facility) would bill the homeowner directly to finance the costs of septage treatment.
A copy of a completed ticket will be left by the hauler with the treatment facility attendant to serve as proof of a pumping event.

5. The property owner would pay the hauler for service and treatment. The hauler would be allowed to utilize a publicly-owned treatment facility by presenting a prepaid ticket (purchased from the management agency) to the treatment facility attendant.

6. Same as above, except the hauler would be billed directly by the management entity, thereby eliminating the need for a prepaid ticket.

7. The hauler vehicles and treatment facilities would be privately-owned and operated. A single fee would serve to pay for pumping, transport, and disposal costs at the time of pumping.

8. Same as above, except that private haulers could contract with individual property owners (or with a sponsoring entity, e.g., on-site management district or property owners' association), and charge an annual fee for system inspections, septage pumping (and possibly system repairs) on a pro-rated basis.

Of the choices presented, there is no single "best option" that a community can adopt. Each scenario has its unique advantages and disadvantages. It is necessary to evaluate the relative merits and drawbacks of each scenario as they apply to a particular situation. Evaluation criteria that should be considered include:

1. Costs of administering the approach (including cost of public sector involvement in pumping and hauling activities).

2. Willingness of available private haulers to participate in a septage management program (especially one utilizing a manifest system).

3. Incidence of cost among users (e.g., are all residents contributing the same toward financing septage treatment facilities, or are only those utilizing the facility paying).

4. Need for a manifest system as part of an overall on-site system management program.

5. Ability of the management entity to adequately collect user fees.

6. Impact on regulatory program caused by frequent pumping, rather than repair of marginal systems.

Most importantly, the specific financing and organizational arrangement for septage transport and disposal should be consistent and compatible with related wastewater management objectives.

Several examples of financing arrangements applied in residuals management programs follow.

RESIDUAL DISPOSAL FINANCING ILLUSTRATION

Financing costs for residuals disposal can be accomplished in a number of ways. The most popular fee structure is a flat fee or a per gallon fee set to cover the costs of pumping, transport treatment, and disposal. The Town of Acton, Massachusetts, utilizes a prepaid coupon method of collecting fees for septage treatment. This is a common method used by public agencies to recover septage treatment costs for wastes hauled by private contractors. A single coupon, purchased by the hauler for $5, covers the cost of treating 1,000 gallons of septage (or an amount of wastes pumped from a single residential unit). Haulers purchase the coupons from the Town Clerk and present them to the treatment facility attendant (along with information specifying the origin of the wastes). The hauler then charges the homeowner an amount sufficient to cover the costs of pumping, transport, and the fixed fee paid for septage treatment. The average cost for septage hauling in Acton is about $50 to $60 per pumping.

The Fairfax County, Virginia, Department of Public Works currently charges an annual license fee of $400 per hauling company. The license fee entitles the hauler to dispose of septage wastes at one of two county-owned and operated wastewater treatment facilities. The revenue derived from the license fees is applied to financing the costs for treatment facility operation and maintenance.

Santa Cruz County, California, has instituted a user charge system which provides periodic system inspection and septic tank pumping. The County Health Department administers the program for two separate on-site management districts in the county. The service charge of $25 per year levied by the Health Department covers the costs of periodic inspections (performed by a private contractor), plus septic tank pumping. Because of the difficulty of finding accessible septage disposal sites and the rising costs of septage treatment in that region, the county is considering a modification to its service charge by removing the pro-rated charge for tank pumping.

CHAPTER 6

FORMULATING AN IMPLEMENTATION PLAN

The implementation plan defines a strategy for moving the program from the planning phase to the operating phase. The information developed in the operations plan and financial plan defines how the program will be funded and who will design, build, and operate the facilities. The implementation plan specifies when these actions will occur and what additional tasks need to be accomplished to construct the facility and establish a workable management program. These additional tasks are likely to include:

1. Developing new legislation, ordinances, and regulations.
2. Negotiating and preparing operating agreements and procedures.
3. Reorganizing or modifying existing agencies; establishing a new agency.
4. Obtaining easements.
5. Staffing and training (or contracting).
6. Public education.
7. Building the facility.

The implementation plan utilizes information prepared in the financial and operations plan to develop a strategy for successful program operation.

The first section of this chapter describes the appropriate steps to be taken in preparing an implementation plan. The second section of this chapter, "Institutional Options for Plan Implementation," offers several institutional options for developing and carrying out the implementation plan. The institutional alternatives are intended to provide a mechanism to overcome some of the common administrative and political obstacles faced by small communities in implementing wastewater management projects. These options should be considered in the initial phases of facility planning as a means of coordinating and directing various planning activities.

GUIDE TO IMPLEMENTATION PLAN FORMULATION

The process of preparing an implementation plan originates early in facility planning. Plan implementation starts with the task of involving appropriate public officials and private interests in the process of defining wastewater management problems and evaluating alternative solutions. It continues through to the formulation of the management plan, refinement of institutional plan recommendations, and construction of the wastewater facility and organization of the management program itself.

The steps involved in preparing an implementation plan, as expressed in this section, are listed below:

Step 1 -- Define management agency roles and responsibilities.

Step 2 -- Develop a mechanism to carry out assigned responsibilities. Prepare a timetable for completion of tasks.

Step 3 -- Establish procedures for providing short- and long-term program evaluations.

A discussion of these steps follows.

Step 1: Define the roles and responsibilities of all participating entities in performing management functions.

The roles and responsibilities of various public and private entities to carry out wastewater system design, construction, operation, and financing activities have been defined in the operations and financial plans. The first activity in implementation plan formulation is to identify all major program participants and their responsibilities in a single framework.

As noted in Step 3 of Chapter 3, in order to expedite program implementation, it is important that local government, state and local regulatory agencies, funding agencies, and the general public participate in the planning process, and are all in agreement with program objectives.

Table 58 presents a format for displaying roles and responsibilities of participating entities, along with initial financial requirements, for a prescribed planning period. Entries along the side of the table identify participating entities in the management program. Column entities specify their responsibilities, applicable funding sources, and allocation of future costs on an annual basis. Table 59, on the other hand, lists potential roles of state agencies to support and complement local management efforts.

Step 2: Develop a mechanism to carry out assigned management responsibilities. Prepare a timetable for the completion of tasks.

There are many activities that must be accomplished in carrying out the recommendations of the operations and financial plans. While these responsibilities are assigned to one or more entities (as shown in Table 58), a method for carrying out these responsibilities should be developed in the implementation plan. Essentially, there are three basic tasks to be performed, for which an institutional arrangement must be developed to ensure their proper implementation:

1. Setting up the management program framework and structure (i.e., designating management agencies).
2. Obtaining legal approvals and agreements.
3. Designing and constructing wastewater facilities and developing administrative policies for system operations.

Table 60 presents a description of some of the major elements of the three implementation tasks. It is important that the timetable prepared in this phase of the planning process accurately reflect these implementation tasks and prerequisite activities in the proper sequence.

Alternative institutional arrangements for assisting communities in developing implementation mechanisms are described in the section in this chapter, "Institutional Options for Plan Implementation."

Step 3: Establish procedures for providing short- and long-term program evaluations.

The management agency should be cognizant of the need to periodically reevaluate its program activities and respond to changing demands and service requirements. The effectiveness of a management program will be ultimately determined by the ability of participating agencies to enforce regulations and to carry out field inspections and system maintenance activities. A formal system of conducting periodic reviews and evaluations of field personnel performance, wastewater facility performance, and water quality changes should be prepared and utilized by the program managers at both the state and local levels. Table 61 proposes a set of performance criteria which can be applied by program managers and directors to evaluate progress through the operational phase.

A work plan for continuing evaluation should be prepared to support the management agency designations and objectives of the program.

TABLE 58. SUMMARY OF MANAGEMENT PROGRAM ENTITIES AND RESPONSIBILITIES

Managing Entity[1]	Description of Responsibilities[2]	Management Functions[3]	Source of Funding [4]	Years[5]				
				1	2	3	4	5... 20

SAMPLE FORMAT

---

[1] Identify participating entities.

[2] Describe (generally) the roles and responsibilities of managing entities, and their jurisdictions.

[3] List applicable specific management functions (e.g., administration, system construction, system inspections, system repairs, planning, operation and maintenance, etc.)

[4] Identify sources of funding (e.g., service fees, user charges, local taxes, Federal grants, etc.). Annual budgets, grant and loan amounts, etc. could also be included, if desired.

[5] Identify planning period. Years can be specified on an annual basis or at intervals (e.g., 3 to 5 years).

TABLE 59. POTENTIAL STATE ROLES IN MANAGEMENT PLAN IMPLEMENTATION AND PROGRAM FORMULATION

1. Establish regulations regarding approval, design, and installation of conventional and alternative small flows systems.

    a. Clarify state/local reponsibilities for review and approval of plans and standards setting and streamline review procedures where possible.

    b. Improve criteria for site suitability determinations and design methods to facilitate optimal systems.

    c. Make regulations performance-oriented; promote and expedite the utilization of appropriate treatment, collection, and disposal methods by elimination of arbitrary and restrictive standards and codes.

2. Coordinate with areawide and state nondesignated water quality management planning efforts regarding on-site problem analysis and policy recommendations.

3. Adopt state enabling legislation and propose amendments as necessary to facilitate alternative local management arrangements.

4. Provide technical and institutional assistance and guidance as appropriate to engineering consultants and local officials regarding consideration of small flow systems and institutional alternatives (through state policy, model ordinances, assistance in preparing grant applications, participation in management entity organizational meetings, and preparation of planning guidelines and model approaches).

5. Conduct training sessions for private sector representatives involved in wastewater system design, installation, and maintenance. License and certify private contractors as required.

6. Support demonstration projects, research and development studies, and field testing of technology to promote the implementation of improved small system technologies.

7. Provide financial assistance in the form of monetary support for capital construction and operational costs and/or in the form of administrative assistance in development of the financial plan, bond marketing, or grant priority alteration.

TABLE 60. TYPICAL IMPLEMENTATION ACTIVITIES

Major Task		Task Activities	Comments
Establish Management Program Framework and Structure	1.	Adopt charters, by-laws, and rules and regulations, including those governing wastewater system design, installation and operation.	Depending on the institutional approach selected, new or modified state legislation, local ordinances, and regulations may be necessary to implement the management program. Where appropriate, the community may wish to enlist the assistance of other agencies in drafting or obtaining support for necessary legislation.
	2.	Designate management agencies and coordinate with state utility commission.	
	3.	Set up a board of directors or identify an existing entity as a governing body to establish program policies and to serve as the principal decision-making authority for the management agency.	
	4.	Select corporate officers or program managers to supervise day-to-day activities.	
	5.	Hold public meetings and referenda as required by state law in order to adopt the recommended organizational structure.	
	6.	Develop regulatory, billing, and monitoring program methods in concert with state utility commission.	
	7.	Define organizational interrelationships.	
Obtain Legal Approvals and Agreements	1.	Permits for surface-water discharge, system operation, and construction.	Obtaining permits for the construction and operation of wastewater systems should be done in conjunction with the system design process. If proper consideration of applicable state and local laws and regulations is made early in the planning phase, securing these permits should be fairly straightforward. If questions of regulatory compliance remain unresolved at this point, considerable delays can result.
	2.	Access easements.	
	3.	Service agreements for facilities construction.	
	4.	Operational arrangements.	
	5.	Letters of intent and interlocal agreements from designated agencies.	
	6.	Operational performance requirements.	
	7.	Property owner/management agency responsibility and liability.	

TABLE 60. (CONTINUED)

Major Task		Task Activities	Comments
Design and Construction of Wastewater Facilities/Developing Administration Policies For System Operation	1.	Coordination with engineer on the preparation of engineering plans and specifications.	Problems which occur during the construction phase of a project are of particular concern because it is the most expensive phase of the plan implementation process. It is crucial that the lead management agency closely monitor progress throughout the facility design and construction process, especially during the construction phase, to assure budgetary and quality control. Since the lead agency in most cases will be responsible for system operation, its operating staff should be well acquainted with the physical layout and overall design of the the system. This requires maintaining day-to-day contact with the engineer and contractor during the entire construction stage.
	2.	Review and approve design drawings.	
	3.	Secure construction funds (grants, loans, bonds, etc.).	
	4.	Inspect materials and equipment supplied by contractors and manufacturers for compliance with specifications.	
	5.	Prepare bid package.	
	6.	Review contractor bids.	
	7.	Contract negotiations with contractors during contract procurement, and throughout construction period.	
	8.	Review and approve payment requests from contractors and subcontractors.	
	9.	Perform periodic site inspection.	
	10.	Hire and train staff.	
	11.	Acquire office space and equipment.	
	12.	Finalize system operation and maintenance arrangements, including construction of new and rehabilitation of failing systems during the operations period.	
	13.	Finalize organizational interrelationships, roles, and responsibilities.	
	14.	Conduct final system inspection.	
	15.	Start up system and program.	

TABLE 61. PROGRAM PERFORMANCE CRITERIA

The following are general performance criteria that can be applied to evaluate short- and long-term program efficiency, productivity, and response to program objectives.

- Has the attitude of the management agency and its governing body towards enforcement of health/environmental regulations enhanced program operations and wastewater system performance?
- Do the legislation and regulations being applied adequately address health and environmental needs?
- Has the legal basis or statutory authority of participating agencies been altered? Does it need clarification or improvement?
- Has the management program become overly complex? Are professional managers necessary?
- Are the activities of participating entities being adequately coordinated?
- Can the participating entities adapt to political and economic changes?
- Does the public have an opportunity to comment on program accomplishments? Has the public been made aware of program activities and budgets during the operational phase?
- Are the program directors sufficiently familiar with program activities, accomplishments, and responsibilities?
- Are the field personnel adequately addressing problems, concerns, or questions from the service area residents?
- Is the staff qualified to handle the work activities? Is job satisfaction provided by the position? Is the level of compensation consistent with prevailing wages? Is personnel advancement possible within the organizational structure?
- Is the wastewater management program consistent with other plans, policies, and objectives of the area?
- Are users able and willing to pay for program sources? Are additional funding mechanisms needed?
- What has the impact of the management program been on community and program budgets?
- Has the public health or water quality been protected or enhanced by the program? Are there other sources of health problems or water pollution problems that need to be addressed?

INSTITUTIONAL OPTIONS FOR PLAN IMPLEMENTATION

Performing the outlined implementation tasks and understanding the various aspects of the planning and implementation process may be difficult for many small communities, especially those that do not maintain a professional staff. Assistance to local entities early in the planning process will help ensure that sound and conscious decisions are made regarding the selection of wastewater system technology, the assessment of institutional and financial requirements and capabilities, and adoption of proper system operation and maintenance practices.

In addition to available information transfer and grant preapplication meetings that are offered to small communities from Federal and state agencies, it may be necessary in some instances to designate an independent third-party advisor to assist small communities in facility planning and implementation activities. These third-party advisors could help small communities manage their grants, provide consultation during plan development, and train staff to perform system operation and maintenance activities.

Third-party advisors can be made available to small communities through the following state and local institutional arrangements:

1. Statewide assistance programs.
2. Local third-party advisory agreements.

Descriptions of these options are provided in this section. Because of the variations among states and local circumstances, the choice of how to provide third-party assistance will depend on the technical and fiscal resources available to states and small communities, and the abilities and preferences of persons involved in the facility planning and implementation process. The intent here is to make states and small communities aware of the institutional options available to them in assisting facility planners in the critical phases of plan preparation and implementation.

Statewide Assistance Programs

States will continue to assume an increasingly important role in allocating construction grants to substate entities in the future. As part of this role, states can offer technical and administrative assistance to small communities by:

1. Applying for financial assistance.
2. Preparing wastewater facility plans.
3. Implementing plan recommendations.

States can also offer assistance to small communities through:

1. State-employed specialists.
2. Private firms (contracted by a state agency).
3. A special agency to provide public service assistance throughout a state.

Table 62 outlines alternatives available to states to assist small communities that are having difficulty understanding and meeting the administrative and financial requirements of the construction grants program. It is expected that these options will be applied differently in each state, depending on the individual state's abilities, preferences, and organizational structure. Table 62 describes these alternatives in detail, and displays the advantages and disadvantages of each. Regardless of the precise option selected in any single situation, preapplication conferences with small community officials and special intermediate progress reviews by an appropriate state entity will help streamline the construction grants allocation process and ensure that communities apply functional technology suited to their needs and circumstances. Several examples of statewide assistance programs follow.

STATEWIDE PROGRAM ASSISTANCE ILLUSTRATION

Several states have adopted different organizational approaches to providing assistance to small communities. The activities of the States of New Hampshire, California, Maryland, New York, Pennsylvania, and Illinois offer examples of different small community assistance techniques.

The state advisory assistance alternative is essentially modelled after New Hampshire's approach to small community assistance. New Hampshire's program is based on a state law which authorizes the state Water Supply and Pollution Control Commission to negotiate engineering and construction contracts for all grantees within the state. This state agency has a group of professionals performing contract negotiations on behalf of small communities. The state's interest in construction grants administration, particularly to small communities, is reinforced by its 20 percent state share and the recent creation of the Division of Small Community Assistance, which assists small communities with financial and administrative aspects of the construction grants program.

TABLE 62. STATEWIDE ASSISTANCE PROGRAM ALTERNATIVES

Alternative	Description	Advantages	Disadvantages
State Advisory Assistance	A state agency would have a central staff to assist grantees. A state would negotiate contracts with private engineering/planning firms for all or certain specified small communities. States would prepare a "prequalified" list of consultants for small communities to review and screen. A state agency would negotiate with a few "screened" firms, and take an active role in Step 1 planning. A state agency would monitor progress during Steps 2 and 3.	1. Simple process that is transferable to many states.	1. Effectiveness will depend on sensitivity of state/local political relations.
		2. Addresses a difficult problem faced by small communities -- contract negotiations.	2. May pose difficulty for contractors with both state and small communities in overseer role.
		3. Central staff could be focal point of small community planning assistance for wastewater and other resource management activities.	3. Concept is most applicable to small states where close state/local relations could be maintained. (May be necessary to involve county or regional substate entities in coordinating or liaison role between state and small community.)
Corporate and Other Advisors	A nonprofit corporation or similar statewide authority would be established to provide a wide range of services communities, including plan reviews, securing financial assistance, and monitoring the design, construction, and operation of the facilities.	1. Corporation would have considerable flexibility in staffing and other administrative procedures.	1. Initial start-up might be slow. (May begin with providing services for state-owned facilities at the beginning.)
		2. Corporation should be sensitive and responsive to local needs since its business depends on client requests.	2. May require state subsidy to finance operations of the corporation.
	The corporation or authority could act as the community's agent in all matters, including applying for grants.	3. The experience of the corporation will help many communities.	

TABLE 62. (CONTINUED)

Alternative	Description	Advantages	Disadvantages
Circuit Riders	Specialists hired directly by state or under contract to state to assist in various aspects of wastewater facility planning, design, construction and operation. Specialists can be assigned to a fixed group of communities or be responsible for a specific area of the state. They could operate from regional offices or possibly from other substate agencies (e.g., regional or county planning agencies). The state could establish this concept under either a direct hiring or contract mechanism.	1. Easy to implement in states with regional offices. 2. Provides greater potential for direct, regular, and personal contact with appropriate local officials. 3. Opportunity exists for providing state assistance to localities on a wide variety of environmental and resource management issues.	1. Could be costly in a large, sparsely populated state. 2. Problem of coordination between circuits. 3. Decentralizes state expertise. Periodic central coordination is necessary.
State-Contracted Advisors	Private contractors hired by state could conduct site visits to small communities to assess community needs and provide appropriate assistance. The state would not directly assist small communities. "Level-of-effort" contracts could be established between state and the contractor. State could hire a single contractor to serve the state, or a group of contractors allocated to different areas of the state.	1. Provides greater flexibility in hiring and travel funding through the use of contractors. 2. Assistance could be provided on an "as-needed" basis to specific communities and for specific needs. 3. Part of the costs could be grant-eligible under Step 1. 4. Numerous contractors with small community assistance exist.	1. Could cause conflicts between state-contractor and community-consultant. 2. Issues regarding "who pays" and "how much" need to be worked out before community accepts assistance. 3. Burden on state for contractor monitoring and coordination.

Source: Adapted from "Options for Third-Party Management of Construction Grants for Small Communities," Preliminary Concept Paper, U.S. Environmental Protection Agency, 5 September 1930. (Part of the 1990 Construction Grants Strategy background papers.)

STATEWIDE PROGRAM ASSISTANCE ILLUSTRATION (CONTINUED)

The State of California has also accomplished a great deal in the area of small community assistance. The state Water Resources Control Board has established an "alternative systems unit" within the grants program to offer advice on facility plans and to identify research needs for small wastewater systems. This unit has also helped to sponsor demonstration and research projects on various wastewater management approaches in the state.

The corporate and other advisors alternative is modelled after the Maryland Environmental Service (MES), a statewide public utility corporation which can enter into agreements with communities to design, construct, and operate water and wastewater treatment projects in Maryland. MES is just now beginning to assist small communities with planning and design of treatment projects, through a recent agreement with the State Department of Health. New York State has a similar nonprofit corporation with similar authority -- the Environmental Facilities Corporation.

The circuit rider alternative is being attempted in the State of Pennsylvania. For this state, seven regional offices provide the primary state assistance to local communities on all matters concerning wastewater management. The role of the regional offices is being intensified to create greater state sensitivity and responsiveness to local problems.

The State of Illinois Environmental Protection Agency has adopted a unique approach to facility plan review to provide more consistent decision-making within the state, and to eliminate "red-tape" and confusion concerning state policies by local governments. The Illinois EPA has created an "Innovative and Alternative Technology Design Standards and Review Panel" to develop design standards for small wastewater systems, and review facility plans where innovative and alternative technology are appropriate.

Local Third-Party Advisory Agreements

Local communities can initiate agreements with private or public entities on their own for assistance in wastewater facility planning, design, construction, and operations monitoring activities. Small communities generally do not have the necessary funds to hire specialized management consultants, however, certain alternatives are available to most small communities to obtain proper assistance and guidance in facilities planning and plan implementation tasks. These alternatives include:

1. Locally-contracted advisors (e.g., private consultants).

2. Substate agency advisors (e.g., regional and county agencies, cooperative extension services, etc.).

Table 63 presents some of these alternatives, with their major advantages and disadvantages. As shown in the table, with certain modifications to the basic concepts, the local third-party agreements could be implemented statewide. Examples of third party agreements include the following:

LOCAL THIRD-PARTY ADVISORY AGREEMENT ILLUSTRATION

The community of Stinson Beach, California, had followed an approach similar to the locally contracted advisors alternative in preparing and implementing its on-site management plan. A professor at a state university was contracted by the Stinson Beach County Water District (the management agency for the on-site wastewater program) to serve as an advisor throughout the long planning, evaluation, and plan implementation period. This consultant assisted in the plan of study preparation, consultant selection for the facility planning work, and work progress reporting. He remains a consultant to the local management agency, and provides expertise in program evaluation and operation.

Many small communities have used the services of county and regional planning to provide assistance on wastewater management concerns, primarily through the

TABLE 63. LOCAL THIRD-PARTY ADVISORY AGREEMENT ALTERNATIVES

Alternative	Description	Advantages	Disadvantages
Local-Contracted Advisors	Similar to state-contracted advisors alternative in Table 62. In this instance, a community would retain a consultant directly to provide overall contract management assistance. Local contractor could prepare a plan of study, provide advice on contracting other private firms and establish implementation mechanisms.	1. Offers community flexibility in selecting consultant and managing consultant activities. 2. Provide opportunity for assuring sensitivity and responsibility to local needs. 3. Cost-sharing under Step 1 may be possible. 4. Brings expertise directly to community officials.	1. Potential for conflict of interest if contractor also becomes directly involved in performing facility planning and design studies. (A clear understanding of roles and responsibilities is necessary at the outset.) 2. Specialized assistance to small communities may be expensive. Large private firms may not be interested in providing management assistance without limited financial opportunities (i.e., limited direct work in planning and design).
Substate Agency Advisors	Substate agencies (e.g., regional or county planning agencies, or county extension service or soil conservation service personnel) could provide assistance to small communities on an "as-needed" basis. Assistance can be provided for a wide variety of activities depending on need and available agency expertise. Concept is similar to circuit-riders (Table 62). Therefore, it could be implemented and funded on a statewide basis.	1. Utilize available expertise at the substate level without creating larger "state" role. 2. These substate entities are currently involved in small community assistance. Sensitivity exists for coordination with other small community planning activities. 3. Agency personnel may be better able to relate to small community needs. Since they are not state employees, sensitive state/local relations would not be exacerbated.	1. Possible fiscal and manpower limitations exist for these substate entities to assume additional responsibilities. 2. Level of expertise in wastewater management may be limited. (Training and information transfer for Federal and state agencies can help to alleviate this problem.)

LOCAL THIRD-PARTY ADVISORY AGREEMENT ILLUSTRATION (CONTINUED)

areawide water quality management planning process. Both designated and nondesignated areawide agencies have assumed direct and indirect roles in preparing facility plans, conducting training and information transfer programs, and implementing wastewater management programs for a variety of community needs.

A recent pilot wastewater management study completed by the Delaware Department of Natural Resources and Environmental Control (DNREC) and its consultant (Roy F. Weston, Inc.) for two small towns (approximately 500 homes) in southern Delaware has demonstrated the critical role a County Extension Service agent can play in the facility planning process. In this instance, the Extension Service agent, at the request of the two towns, served as a liaison to the state agency and consultant, and as a spokesman for the communities involved in the facility planning process. The Extension Service agent gave the communities a sense of assurance that the planning process was sensitive to local needs and resident capabilities.

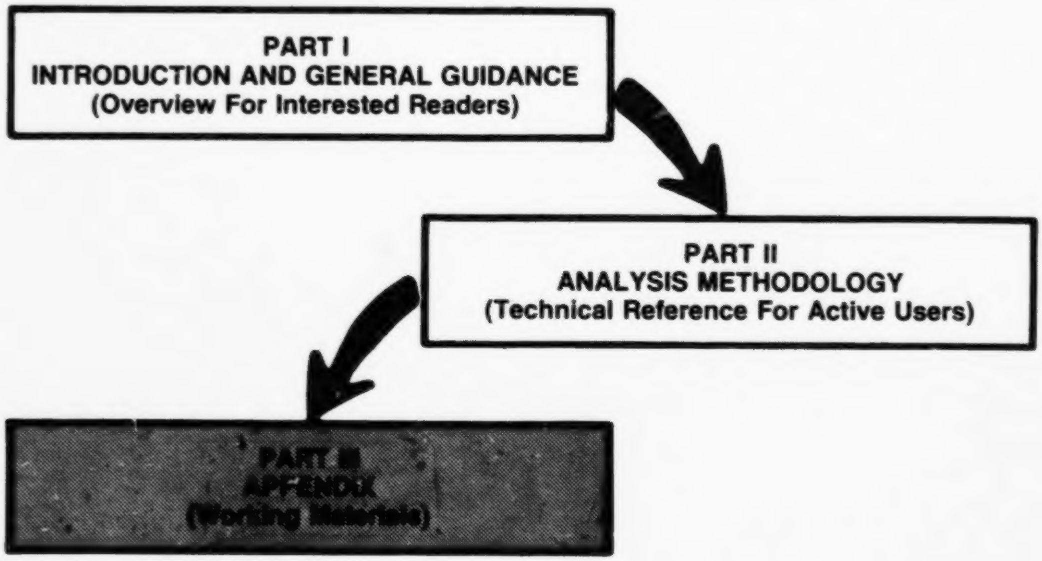
PART III: APPENDIX

The appendix is a compendium of useful information to persons setting up management programs. Examples of ordinances, other regulatory materials, and a bibliography are included.

The appendix is divided into three sections, as follows:

1. Sample enabling legislation for on-site and small community management agencies.
2. Example service agreements for management agency/homeowner arrangements.
3. Bibliography.

These materials are provided to assist in addressing an important issue for small wastewater systems planning, that of relying on facilities (pumps or septic tanks) that are located on private property as a permanent wastewater disposal method.


PART I
INTRODUCTION AND GENERAL GUIDANCE
(Overview For Interested Readers)
PART II
ANALYSIS METHODOLOGY
(Technical Reference For Active Users)
PART III
APPENDIX
(Working Materials)

SECTION III-1

SAMPLE ENABLING LEGISLATION

Several states have developed and adopted special legislation to create local entities to manage small wastewater systems. The following list is a sample of the range of legislation prepared to date:

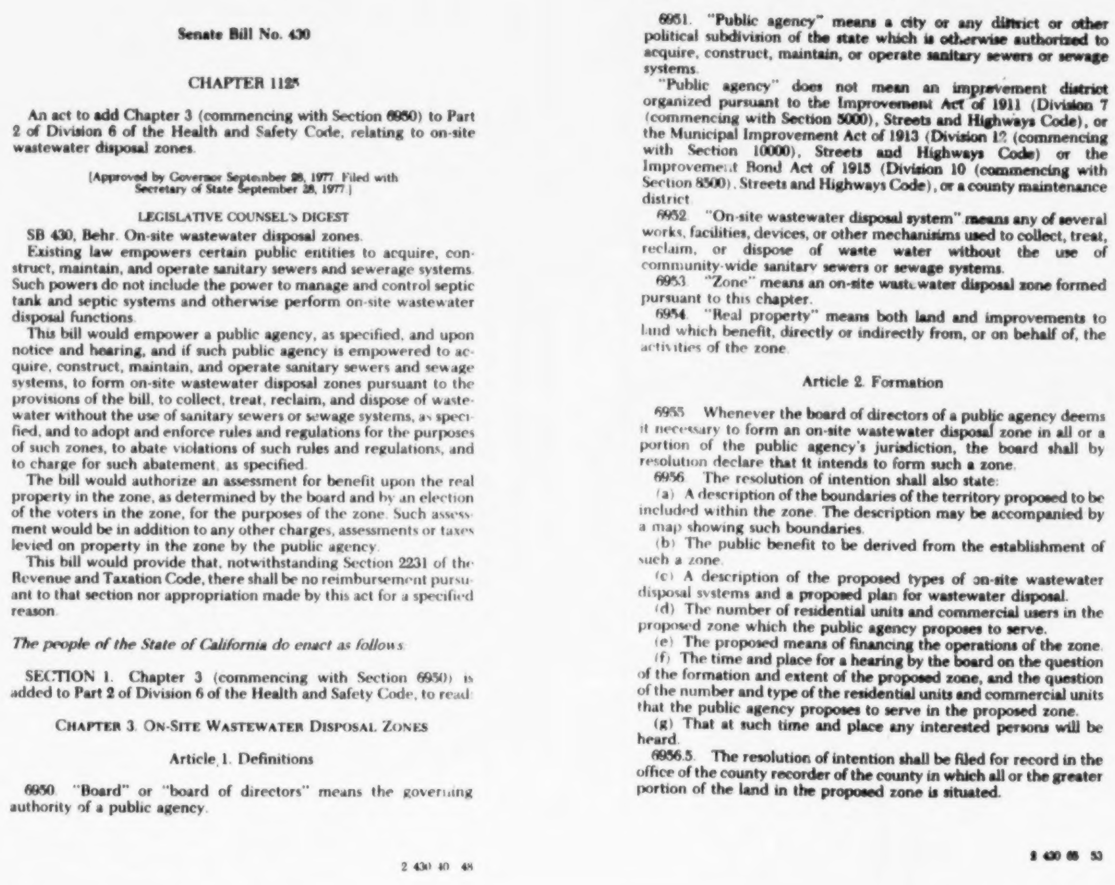
1. State legislation expanding the authority of certain public entities to assume on-site management responsibilities. (State of California Senate Bill No. 430, On-Site Wastewater Disposal Zones.)

2. Model ordinance for establishing county management programs. (On-site wastewater management districts in Iowa.)

3. Guidelines for establishing on-site management programs pursuant to special state legislation. (State of Washington, Department of Health and Social Services, Guidelines for the Formation and Operation of On-Site Waste Management Systems.)

Existing state legislation should be closely examined to determine whether sufficient legal authority already exists to provide the management functions defined by the sample legislation.

STATE OF CALIFORNIA
SENATE BILL NO. 430
ON-SITE WASTEWATER DISPOSAL ZONES



Senate Bill No. 430

CHAPTER 1125

An act to add Chapter 3 (commencing with Section 6950) to Part 2 of Division 6 of the Health and Safety Code, relating to on-site wastewater disposal zones.

[Approved by Governor September 28, 1977. Filed with Secretary of State September 28, 1977.]

LEGISLATIVE COUNSEL'S DIGEST

SB 430, Behr. On-site wastewater disposal zones.

Existing law empowers certain public entities to acquire, construct, maintain, and operate sanitary sewers and sewerage systems. Such powers do not include the power to manage and control septic tank and septic systems and otherwise perform on-site wastewater disposal functions.

This bill would empower a public agency, as specified, and upon notice and hearing, and if such public agency is empowered to acquire, construct, maintain, and operate sanitary sewers and sewage systems, to form on-site wastewater disposal zones pursuant to the provisions of the bill, to collect, treat, reclaim, and dispose of wastewater without the use of sanitary sewers or sewage systems, as specified, and to adopt and enforce rules and regulations for the purposes of such zones, to abate violations of such rules and regulations, and to charge for such abatement, as specified.

The bill would authorize an assessment for benefit upon the real property in the zone, as determined by the board and by an election of the voters in the zone, for the purposes of the zone. Such assessment would be in addition to any other charges, assessments or taxes levied on property in the zone by the public agency.

This bill would provide that, notwithstanding Section 2231 of the Revenue and Taxation Code, there shall be no reimbursement pursuant to that section nor appropriation made by this act for a specified reason.

The people of the State of California do enact as follows:

SECTION 1. Chapter 3 (commencing with Section 6950) is added to Part 2 of Division 6 of the Health and Safety Code, to read:

CHAPTER 3. ON-SITE WASTEWATER DISPOSAL ZONES

Article 1. Definitions

6950. "Board" or "board of directors" means the governing authority of a public agency.

6951. "Public agency" means a city or any district or other political subdivision of the state which is otherwise authorized to acquire, construct, maintain, or operate sanitary sewers or sewage systems.

"Public agency" does not mean an improvement district organized pursuant to the Improvement Act of 1911 (Division 7 (commencing with Section 5000), Streets and Highways Code), or the Municipal Improvement Act of 1913 (Division 12 (commencing with Section 10000), Streets and Highways Code) or the Improvement Bond Act of 1915 (Division 10 (commencing with Section 8500), Streets and Highways Code), or a county maintenance district.

6952. "On-site wastewater disposal system" means any of several works, facilities, devices, or other mechanisims used to collect, treat, reclaim, or dispose of waste water without the use of community-wide sanitary sewers or sewage systems.

6953. "Zone" means an on-site wastewater disposal zone formed pursuant to this chapter.

6954. "Real property" means both land and improvements to land which benefit, directly or indirectly from, or on behalf of, the activities of the zone.

Article 2. Formation

6955. Whenever the board of directors of a public agency deems it necessary to form an on-site wastewater disposal zone in all or a portion of the public agency's jurisdiction, the board shall by resolution declare that it intends to form such a zone.

6956. The resolution of intention shall also state:

(a) A description of the boundaries of the territory proposed to be included within the zone. The description may be accompanied by a map showing such boundaries.

(b) The public benefit to be derived from the establishment of such a zone.

(c) A description of the proposed types of on-site wastewater disposal systems and a proposed plan for wastewater disposal.

(d) The number of residential units and commercial users in the proposed zone which the public agency proposes to serve.

(e) The proposed means of financing the operations of the zone.

(f) The time and place for a hearing by the board on the question of the formation and extent of the proposed zone, and the question of the number and type of the residential units and commercial units that the public agency proposes to serve in the proposed zone.

(g) That at such time and place any interested persons will be heard.

6956.5. The resolution of intention shall be filed for record in the office of the county recorder of the county in which all or the greater portion of the land in the proposed zone is situated.

6957. (a) A proposal to form a zone within a public agency may also be initiated by filing a petition with the board. Such a petition shall contain all the matters specified in subdivisions (a), (b), (c), and (d) of Section 6956. Such a petition shall be signed as provided in either of the following:

(1) By not less than 10 percent of the voters who reside within the territory proposed to be included within the zone.

(2) By not less than 10 percent of the number of owners of real property, including both land and improvements to land, within the territory proposed to be included within the zone who also own not less than 10 percent of the assessed value of the real property within such territory.

(b) Each signer of a petition shall add to his or her signature, the date of signing. If the signer is signing the petition as a voter, he or she shall add to his or her signature his or her place of residence, giving street and number, or a designation sufficient to enable the place of residence to be readily ascertained. If the signer is signing the petition as an owner of real property, he or she shall add to his or her signature a description of the real property owned by him or her sufficient to identify the real property.

(c) Following certification of the petition, the board shall set the time and place of the hearing on the question of the formation of the proposed zone.

6958. (a) Notice of the hearing shall be given by publishing a copy of the resolution of intention or the petition, pursuant to Section 6066 of the Government Code, prior to the time fixed for the hearing in a newspaper circulated in the public agency.

(b) Notice of the hearing shall also be given to the local health officer, the board of supervisors, the governing body of any other public agency within the boundaries of the proposed zone, the governing body of any public agency whose sphere of influence, as determined pursuant to the provisions of Section 54774 of the Government Code, includes the proposed zone, the affected local agency formation commission, and the regional water quality control board in whose jurisdiction the proposed zone lies.

6959. The hearing by the board on the question of the formation of the proposed zone shall be no less than 45 days nor more than 60 days from adoption of a resolution of intention or the receipt of a petition containing a sufficient number of signatures.

6960. After receiving notice pursuant to subdivision (b) of Section 6958, a local health officer shall review the proposed formation and report his or her findings in writing to the board of directors of the public agency. The report shall specify the maximum number, type, volume, and location of on-site wastewater disposal systems which could be operated within the proposed zone without individually or collectively, directly or indirectly, resulting in a nuisance or hazard to public health. The local health officer may require from the public agency such information as may be reasonably necessary to make the findings required in this section.

6960.1. After receiving notice pursuant to subdivision (b) of Section 6958, the affected regional water quality control board shall review the proposed formation and report its findings in writing to the board of directors of the public agency. The report shall specify the maximum number, type, volume, and location of on-site wastewater disposal systems which could be operated within the proposed zone without individually or collectively, directly or indirectly, resulting in a pollution or nuisance, or adversely affecting water quality. The regional water quality control board may require from the public agency such information as may be reasonably necessary to make the findings required in this section.

6960.2. The number, type, volume, and location of on-site wastewater disposal systems to be operated within the zone shall not exceed the number specified pursuant to either Section 6960 or Section 6960.1.

6960.3. The formation of an on-site wastewater disposal zone shall be subject to review and approval by a local agency formation commission which has adopted rules and regulations affecting the functions and services of special districts pursuant to Article 4 (commencing with Section 54850) of Chapter 6.6 of Part 1 of Division 2 of Title 5 of the Government Code.

6960.4. Prior to any decision on the question of the formation of the proposed zone, the board shall obtain approval for the proposed plan for wastewater disposal from the affected regional water quality control board if such plan involves the disposal of wastewater to a wastewater treatment facility. For any other method of wastewater disposal, and prior to any decision, the board shall obtain approval for the proposed plan from the local health officer and the affected regional water quality control board. The affected regional water quality control board or the local health officer shall not approve any plan which does not comply with applicable requirements of federal, state, regional, or local law, order, regulation, or rule relating to water pollution, the disposal of waste, or public health.

6961. At the time and place fixed in the resolution of intention or the petition, or at any time or place to which the hearing is adjourned, any interested person may appear and present any matters material to the questions set forth in the resolution of intention or the petition. At the hearing the board shall also hear the reports of any local health officer, and any public agency with statutory responsibilities for setting water quality standards, regarding any matters material to the questions set forth in the resolution of intention or the petition.

6962. At the hearing the board shall also hear and receive any oral or written protests, objections, or evidence which shall be made, presented, or filed. Any person who shall have filed a written protest may withdraw the same at any time prior to the conclusion of the hearing. The board shall have the following powers and duties:

(a) To exclude any territory proposed to be included in a zone when the board finds that such territory will not be benefited by becoming a part of such zone.

(b) To include any additional territory in a proposed zone when the board finds that such territory will be benefited by becoming a part of such zone.

6963. At the close of the hearing the board shall find and declare by resolution that written protests, filed and not withdrawn prior to the conclusion of the hearing, represent one of the following:

(a) Less than 35 percent of either of the following:

(1) The number of voters who reside in the proposed zone.

(2) The number of owners of real property in the proposed zone who also own not less than 35 percent of the assessed value of the real property within the proposed zone.

(b) Not less than 35 percent but less than 50 percent of either of the following:

(1) The number of voters who reside in the proposed zone.

(2) The number of owners of real property in the proposed zone who also own not less than 35 percent but less than 50 percent of the assessed value of the real property within the proposed zone.

(c) Not less than 50 percent of either of the following:

(1) The number of voters who reside in the proposed zone.

(2) The number of owners of real property in the proposed zone who also own not less than 50 percent of the assessed value of the real property within the proposed zone.

6964. If the number of written protests filed and not withdrawn is the number described in subdivision (c) of Section 6963, the board shall abandon any further proceedings on the question of forming a proposed zone.

6965. If the number of written protests filed and not withdrawn is the number described in subdivision (a) of Section 6963, the board shall find and declare by resolution all of the following:

(a) A description of the exterior boundaries of the proposed zone.

(b) The number of on-site wastewater disposal systems which the public agency proposes to acquire, operate, maintain, or monitor.

(c) That the operation of the proposed zone will not result in land uses that are not consistent with applicable general plans, zoning ordinances, or other land use regulations.

6966. The board may order the formation of the zone either without election or subject to confirmation by the voters upon the question of such formation. However, the board shall not order any such formation without an election if the number of written protests filed and not withdrawn is a number described in subdivision (b) of Section 6963.

6967. If the board does not order the formation of the proposed zone, an election on the question shall be conducted if, within 30 days of the date upon which the board did not order the formation, the board receives a petition requesting such an election signed by

either of the following:

(a) Not less than 35 percent of the voters who reside within the territory proposed to be included within the zone.

(b) Not less than 35 percent of the number of owners of real property within the territory proposed to be included within the zone who also own not less than 35 percent of the assessed value of the real property within such territory.

6968. Any election conducted pursuant to the provisions of this chapter shall be conducted pursuant to the provisions of the Uniform District Election Law (Part 3 (commencing with Section 23500), Division 12, Elections Code).

6969. After the canvass of returns of any election on the question of forming a proposed zone, the board shall adopt a resolution ordering the formation of the zone if a majority of votes cast at such election are in favor of such formation.

6970. No public agency shall form a zone which includes any territory already included within another zone.

6971. No public agency shall form a zone if such formation will permit other land uses which are not consistent with the general plans, zoning ordinances, or other land use regulations of any county or city within which the proposed zone is located.

6972. After the formation of the zone pursuant to this article, all taxes levied to carry out the purposes of the zone shall be levied exclusively upon the property taxable in the zone by the public agency.

6973. If the board does not form a zone after the close of a hearing in accordance with Section 6967 and no petition is filed pursuant to Section 6967, or if the board abandons proceedings on the proposal to form a zone, or if the formation of a zone is not confirmed by the voters, no further proceeding shall be taken thereon. No application for a subsequent proposal involving any of the same territory and undertaken pursuant to the provisions of this chapter shall be considered or acted upon by the public agency for at least one year after the date of disapproval of, abandonment of, or election on the proceedings.

Article 3. Powers

6975. An on-site wastewater disposal zone may be formed to achieve water quality objectives set by regional water quality control boards, to protect existing and future beneficial water uses, protect public health, and to prevent and abate nuisances. Whenever an on-site wastewater disposal zone has been formed pursuant to this chapter, the public agency shall have the powers set forth in this article, which powers shall be in addition to any other powers provided by law. A public agency shall exercise its powers on behalf of a zone.

6976. An on-site waste water disposal zone shall have the following powers:

(a) To collect, treat, reclaim, or dispose of waste water without the use of sanitary sewers or community sewage systems and without degrading water quality within or outside the zone.

(b) To acquire, design, own, construct, install, operate, monitor, inspect, and maintain on-site wastewater disposal systems, not to exceed the number of systems specified pursuant to either Section 6960 or Section 6960.1, within the zone in a manner which will promote water quality, prevent the pollution, waste, and contamination of water, and abate nuisances.

(c) To conduct investigations, make analyses, and monitor conditions with regard to water quality within the zone.

(d) To adopt and enforce reasonable rules and regulations necessary to implement the purposes of the zone. Such rules and regulations may be adopted only after the board conducts a public hearing after giving public notice pursuant to Section 6066 of the Government Code.

6977. The district shall immediately do all such acts as are reasonably necessary to secure compliance with any federal, state, regional, or local law, order, regulation, or rule relating to water pollution or the discharge of pollutants, waste, or any other material within the area of the district. For such purpose, any authorized representative of the district, upon presentation of his credentials, or, if necessary under the circumstances, after obtaining an inspection warrant pursuant to Title 13 (commencing with Section 1822.50) of Part 3 of the Code of Civil Procedure, shall have the right of entry to any premises on which a water pollution, waste, or contamination source, including, but not limited to, septic tanks, is located for the purpose of inspecting such source, including securing samples of discharges therefrom, or any records required to be maintained in connection therewith by federal, state, or local law, order, regulation, or rule.

6978. (a) Violation of any of the provisions of a rule or regulation adopted pursuant to subdivision (d) of Section 6976 may be abated as a public nuisance by the board. The board may by regulation establish a procedure for the abatement of such a nuisance and to assess the cost of such abatement to the violator. If the violator maintains the nuisance upon real property in which he has a fee title interest, the assessment shall constitute a lien upon such real property in the manner provided in subdivision (b).

(b) The amount of any costs, which are incurred by the zone in abating such a nuisance upon real property, shall be assessed to such real property and shall be added to, and become part of, the annual taxes next levied upon the real property subject to abatement and shall constitute a lien upon that real property as of the same time and in the same manner as does the tax lien securing such annual taxes. All laws applicable to the collection and enforcement of county ad valorem taxes shall be applicable to such assessment, except that if any real property to which such lien would attach has been transferred or conveyed to a bona fide purchaser for value, or if a lien of a bona fide encumbrancer for value has been created and attached thereon, prior to the date on which such delinquent charges appear on the assessment roll, then a lien which would otherwise be imposed by this section shall not attach to such real property and the delinquent and unpaid charges relating to such property shall be transferred to the unsecured roll for collection. Any amounts of such assessments collected are to be credited to the funds of the zone from which the costs of abatement were expended.

6979. (a) The owner of any real property upon which is located an on-site wastewater disposal system, which system is subject to abatement as a public nuisance by the zone, may request the zone to replace or repair, as necessary, such system. If replacement or repair is feasible, the board may provide for the necessary replacement or repair work.

(b) The person or persons employed by the board to do the work shall have a lien, subject to the provisions of subdivision (b) of Section 6978, for work done and materials furnished, and the work done and materials furnished shall be deemed to have been done and furnished at the request of the owner. The zone, in the discretion of the board, may pay all, or any part, of the cost or price of the work done and materials furnished; and, to the extent that the zone pays the cost or price of the work done and materials furnished, the zone shall succeed to and have all the rights, including, but not limited to, the lien, of such person or persons employed to do the work against the real property and the owner.

6980. A board may exercise all of the public agency's existing financial powers on behalf of a zone, excepting that any assessment or tax levied upon the real property of a zone shall be subject to the provisions of Sections 6978 and 6981.

6981. Notwithstanding any other provision of law, a public agency may levy an assessment reasonably proportional to the benefits derived from the zone, as determined by the board, and the voters pursuant to the provisions of Article 6 (commencing with Section 2285) of Chapter 3 of Part 4 of Division 1 of the Revenue and Taxation Code. Such benefit assessment shall be in addition to any other charges, assessments, or taxes otherwise levied by the public agency upon the property in the zone.

SEC. 2. No appropriation is made by this act, nor is any obligation created thereby under Section 2231 of the Revenue and Taxation Code, for the reimbursement of any local agency for any costs that may be incurred by it in carrying on any program or performing any service required to be carried on or performed by it by this act because this act will be applied under limited circumstances and when so applied the requirements of the act will not result in significant identifiable increased costs.

O

Section 2. Application of Ordinance

The procedures in this ordinance shall be used by the Board of Supervisors of ________________________ county, Iowa, for the establishment and operation of on-site wastewater management districts in this county.

Section 3. Purpose

The purposes of this ordinance are:

A. To insure the proper operation of the on-site wastewater treatment systems in order to protect the public health, water quality and the environment.

B. To allow for the use of the more high maintenance, innovative or alternative on-site wastewater treatment systems where "conventional" on-site systems are not appropriate.

Section 4. Definitions

"On-site wastewater treatment system" means any works or facilities used to collect, treat, reclaim or dispose of domestic wastewater on-site from individual dwellings or buildings or a cluster of two or more dwellings or buildings.

A "conventional wastewater treatment system" means any septic tank with a non-pressurized subsurface soil absorption field or bed.

Section 5. District Boundaries

The on-site wastewater management district will be responsible for the design, construction, repair, operation and maintenance of all on-site wastewater treatment systems within (specify all or a portion of county).

Section 6. Extension of District Boundaries

The boundaries of any on-site wastewater management district established on passage of this ordinance may be extended by amending Section 5. An extension need not be contiguous to the existing district.

Section 7. Administration

Upon establishment of a district, the county board of health (or county engineer, or specified board of trustees) shall assume the powers and duties provided under this ordinance.

Section 8. Management Program

A. The administration shall develop a detailed management program for the district.

B. The administration shall also develop reasonable rules and regulations necessary to implement the purposes of this ordinance.

C. The adoption of the management program and the rules and regulations shall be by resolution of the county board of supervisors.

Section 9. Powers and Duties

The administration may:

A. Collect, treat, reclaim and dispose of wastewater without degrading the water quality within or outside of the district.

B. Acquire, design, own, construct, install, operate, monitor, inspect and maintain on-site wastewater treatment systems within the district in a manner which will protect public health, promote water quality, prevent pollution and abate nuisances.

C. Employ and terminate the employment of those employees necessary to operate and maintain the detailed management plan, and contract with any firm or agency to perform necessary services.

D. Incur indebtedness, and impose and collect assessments for improvements where appropriate, as provided by state law, to implement the purposes of this ordinance.

Section 10. Inspections

The administration's authorized representative may, with the consent of the owner or occupant, enter any premises in the district on which a wastewater treatment system is located for the purpose of inspecting the system, securing samples or records, or making repairs. If the owner or occupant refuses admittance there to, or if prior to such refusal, the authorized representative demonstrates the necessity for a warrant, the authorized representative may make application under oath or affirmation, to the district court for issuance of a search warrant.

Section 11. Costs

The administration shall establish a service fee schedule to recover the operating and administration costs of the district. The costs of serving particular properties shall be paid by the owners of those properties benefitted. Failure to pay a service fee when due shall create a lien against the property as provided by state law.

Section 12. Enforcement

A violation of a rule adopted pursuant to Section 8 of this ordinance shall constitute a simple misdemeanor.

Section 13. Severability Clause

If any section, provision or part of this ordinance shall be adjudged invalid or unconstitutional, such adjudication shall not affect the validity of the ordinance as a whole or any section, provision or part thereof not adjudged invalid or unconstitutional.

Section 14. When Effective

This ordinance shall be effective after its final passage, approval and publication as provided by law.

GUIDELINES FOR THE FORMATION AND OPERATION OF ON-SITE MANAGEMENT SYSTEMS

In accordance with the provisions of WAC 248-96-070(4) the following Guidelines set forth the minimum provisions to be incorporated into any On-site Waste Management System established in satisfaction of the requirements of WAC 248-96-070(3). Unless authorized by the Washington State Department of Ecology, these guidelines shall not apply to facilities constructed or operated in accordance with a waste discharge permit issued by that Department.

****

A. Definitions: In addition to those definitions set forth in WAC 248-96-020, and by this reference made a part hereof, the following terms shall have the meaning indicated:

(1) "Developer" - Any person, or the heirs, successors, or assigns of such person, who owns and/or proposes or intends to develop a subdivision or multiple housing unit project designed to exceed the unit or population densities or flows set forth in WAC 248-96-070(1).

(2) "Purchaser" - Any person, or the heirs, successors or assigns of such person, who purchases and/or leases one or more units in a subdivision or multiple housing unit project from developer as herein defined.

(3) "Management" - Any person who forms and operates an on-site waste management system for the purposes of and under the provisions of these guidelines, or the heirs successors or assigns of such person.

B. Management - Eligible Persons: Management systems may be formed by a metropolitan municipal corporation operating a sewage utility; by an incorporated city or town operating a sewage utility; by a county government through the County Area Services Act (Chapter 36.94 RCW) or through any appropriate agency or department of county government; by a sewer district; or by a water or public utility district operating a sewer district. If no municipal agency is able or willing to operate such a management corporation, a special management corporation may be organized to serve as a management system subject to the special provisions of these guidelines.

C. Continuity: Once established, the management system must continue to function until all on-site sewage systems under its management have been abandoned and the dwelling units or other buildings served by such on-site systems have been connected to an approved sewerage system.

D. Existing Statutes, Rules and Regulations, etc. - Conflicts: The waste management system must be set up in conformance with existing statutes and the rules and regulations of any applicable regulatory agencies. Any portions of these guidelines in conflict with statutes limiting the authority of any management will not be applicable; however, management may be required to find a substitute for the non-applicable requirement.

E. Management System Contract: The management system shall operate through a contract between management and developer. The contract must contain, but need not be limited to, a complete description of all rights, duties, obligations, and commitments of management, developer, and purchaser; a description of all maintenance and operations requirements; and, otherwise, all of the elements set forth in these guidelines.

The contract must provide:

(1) Agreement by management to provide maintenance and operation of on-site sewerage systems, provide surveillance of functioning of on-site sewerage systems, keep records, collect fees, disburse funds, and perform all other duties set forth in these guidelines as are assigned to management.

(2) Agreement by developer that, when selling or leasing property, as a condition of sale or lease he will require the contract of sale, property deed or lease to include a clause wherein the purchaser agrees to conform to the provisions of the management system contract.

(3) That developer shall agree to provide each purchaser a full and complete copy of the management system contract prior to purchaser's signing of purchase contract.

(4) That, in the event the developer retains possession of individual lots which contribute sewage to an on-site sewerage system, the developer's obligations will include those of a purchaser with respect to those individual lots.

(5) Means of making amendments, additions, or deletions by mutual agreement of management, developer, and purchaser, and as approved by the local health officer and other applicable regulatory agencies.

(6) The right of management to contract with public or private agencies for labor and other services.

(7) That management shall employ competent personnel, as determined by the local health officer and other applicable regulatory agencies, familiar with the maintenance and operation of the types of on-site sewerage systems under its management.

(8) An identification of the portion of the sewerage system for which management shall exercise responsibility (e.g., "commencing at the first point of connection to a treatment device,"or",at a point two feet outside the structure being served").

(9) A complete identification and definition of all rights of purchaser, management, and developer; and compliance with regulations of applicable regulatory agencies.

(10) Establish a method for the transfer of authority to another entity. acceptable to the regulatory agencies in the event that such transfer is necessary.

(11) Provision for allocation of restoration costs as required in Section I, Restoration.

(12) Provision for purchaser's right to perform work, if such work is permitted by management.

(13) The contract shall clearly state that in the event the properties are connected to an alternate sewage disposal system, the costs of such connection, if any, shall be the obligation of the property owner.

F. Financial Solvency: Management shall assure financial solvency of its management responsibilities. Financial arrangements shall include, but not be limited to the following considerations:

(1) An accounting and audit system in accordance with any applicable statutes.

(2) A standard maintenance and operation fee.

(3) Fees for initial installation of on-site sewerage systems.

(4) Establishment of an emergency fund.

(5) Preparation of a rate structure for various services that may be entailed beyond routine operation and maintenance due to variations in on-site sewerage systems being serviced.

(6) Permit billing purchaser for any routine repair work, replacement, emergency work or modifications undertaken on behalf of purchaser's installation to cover costs of materials and labor, and other valid associated costs.

(7) Establishment of a method of rate adjustment to maintain adequate funds. Rates shall be reviewed annually and adjusted accordingly.

(8) Provide for the collection of delinquent payments through property lien or other acceptable method.

(9) Establishment of a method of final disbursement of funds on hand and collectable at such time as the management system is dissolved.

(10) Establishment of a method of transfer of funds at such time as the management responsibilities are transferred.

(11) Assurance that adequate operation and maintenance funds are available from the initiation of sewage system operation.

G. Maintenance and Operation - Management and Purchaser: A maintenance and operation manual, specifically suited to the nature of the on-site sewerage system for which management will be responsible, shall be prepared. A copy of the manual shall be submitted to the local health officer and other applicable regulatory agencies. The manual shall include, but need not be limited to, schedules and/or procedures for the following items.

(1) Periodic inspection of facilities to ascertain efficiency of operation and general condition of equipment.

(2) Record keeping of inspections, monitoring, work done, conditions found, etc. Records shall be available for inspection by the regulatory agencies.

(3) Periodic pumping of septic tanks or other storage tanks by licensed septic tank pumpers.

(4) Periodic maintenance of motors, pumps, etc.

(5) Replacement or repair of worn or damaged equipment.

(6) Responding to emergencies. Emergency procedures shall include provisions for:

(a) Notifying users and applicable regulatory agencies of the emergency.

(b) Determining cause of any major breakdown or of any essentially complete failure of any on-site sewerage system to function as designed. The findings shall be submitted in writing to the applicable regulatory agencies.

(c) Making repairs or replacements or modifications of design as required to restore functioning of system.

(d) Working with purchaser and regulatory agency to prepare and install substitute system, in the event of irreparable failure of system to meet design requirements.

(7) Annual reporting of system maintenance and operation to applicable regulatory agencies.

H. Right to Enter on Purchaser's Property: Management shall have the right to enter upon purchaser's property to perform routine inspections or work and to respond to emergency conditions.

I. Restoration: Whenever work is performed by management on purchaser's property, management shall restore all paving, planting, and other features of purchaser's property to its original condition as nearly as possible. Provision for allocation of restoration costs shall be included in the management contract.

J. Purchaser's Right to Perform Work: Except in the event of an emergency that demands immediate action, upon notification to the management by the puchaser, management may permit purchaser to perform repairs, replacements, and other work other than routine maintenance and operation on those portions of the sewerage system located on purchaser's property. If management permits such work by purchaser, it shall be provided for in the management contract, and shall be performed under the following conditions:

(1) Design, materials, work to be performed, and time for completion shall be as directed by management, and shall comply with local health department and other applicable local regulations.

(2) Cost of labor and materials shall be borne by purchaser.

(3) Completed work shall be inspected and approved in writing by management before being placed in service.

(4) Management may correct any improper construction performed by purchaser or require purchaser to make such corrections, and may complete any work not finished by purchaser within the time limit set by management, and may bill purchaser for all labor and materials.

(5) Management shall enter such work into the maintenance and operation record.

K. Special Management Corporation: In the event no municipal corporation, as identified in Section B., is able or willing to serve in a management capacity and has indicated this decision in writing, a special private corporation may be established to serve this purpose.

(1) Structure and Criteria - In addition to meeting the foregoing criteria and requirements, such a corporation must meet the following conditions:

(a) It must be incorporated.

(b) It must have elected officers.

(c) It must have a constitution and by-laws.

(d) There must be financial solvency on a continuous basis through a method of financing construction, maintenance, operation and emergency work related to the sewerage system to the exclusion or whatever other obligations the corporation may assume in other fields. Rates must be set at a level which will provide ample funds for all sewerage operation and maintenance costs and cover emergencies as they occur.

(e) There must be permanency; i.e., the corporation must be continuously in operation with regard to its sewerage activities so long as there is a need for such management service. There must be built into the organization a provision to eventually transfer its sewerage responsibilities to a municipal corporation, as identified in Section B, should such a transfer become feasible.

(f) There must be a municipal corporation, as identified in Section B., to whom control and operation of the management corporation will pass in trusteeship in the event that no persons are willing to serve as officers of the corporation. In the event that no municipal corporation is able or willing to serve as a trustee, a private organization, acceptable to the regulatory agencies, may serve in this capacity. The municipal corporation or the private organization shall have the opportunity to review and comment on plans and specifications and perform inspections during construction. They shall also be notified of any future construction or major repairs.

(g) Funds collected for sewerage purposes must be kept in an account to be used for the sole purpose of carrying out the functions of the sewerage management system.

(h) There shall be lien powers to assure the collection of delinquent sewerage debts, and provisions for adjustment of rates from time to time to meet the costs of operation.

(i) In the event the corporation is initially run by a board of trustees, provision should be made for an election of corporate officers at the first annual meeting and transfer of control from the initial trustees to the newly elected board of trustees or corporate officers. Membership of these groups shall be from among the residents of the community served.

    (1) Elections may be delayed beyond the first annual meeting until at least some stated number of voters are actually resident in the community.

    (2) The intent of this subsection is to assure control of the management system passing to the residents of the community as soon as possible.

(j) There must be assurance of good communication between the corporate leadership and the resident population. There must be adequate notice of meetings, positive service of such notice, and meetings must be held at times and places convenient to the residents and adequate space provided.

(k) A review board shall be established. The responsibilities of the review board shall include mediation and review of appeals regarding disputes arising on any matter relating to the relationship between purchaser and management. Decisions of the review board shall be final and binding on all parties involved.

(2) Implementation - The implementation of the special management corporation shall include, but need not be limited to, the following considerations.

(a) The developer shall assume complete responsibility for financing and managing the operation of the on-site sewage disposal systems during the period of development prior to transfer of the management responsibilities to the special management corporation.

(b) During the period of developer involvement with the on-site sewage disposal systems, there shall be an entity, as defined in subsection 1.f above, to whom control and operation of the systems will pass in trusteeship in the event that the developer becomes unable to meet his responsibilities.

(c) A two year performance bond, of an amount adequate to provide operation and management for that period, and in favor of the entity identified in (b) above or another entity acceptable to the regulatory agencies, shall be posted by the developer.

(d) A method of transfer of the management functions from the developer to the special management corporation shall be provided. Transfer of the management functions shall be completed within two years, unless otherwise authorized by the approval authority.

L. Approval of Management Systems: All management systems that are proposed for specific developments must be reviewed and approved by the health officer and where necessary, by the Department of Ecology and/or the Department of Social and Health Services. If special services, such as financial review by a Certified Public Accountant, are required in the review of a management system by the health officer, the cost of such services shall be borne by the developer. Approval will take into consideration the size of the development and the extent to which the management system conforms to the requirements of any existing comprehensive land use plan for the jurisdictional area involved.

SECTION III-2

SERVICE AGREEMENTS

The U.S. EPA would prefer that a community applying for a construction grant for a small wastewater system project obtain ownership of the system prior to applying for Step 2 funds. EPA's regulations allow life-of-project easements or convenants as an alternative to actual public ownership to qualify systems for construction grant funding. Easements and service agreements offer an attractive means of providing clearer access to the wastewater system to ensure necessary inspection, maintenance, and repair activities. Service agreements and easements also provide a convenant method for providing management functions where full public ownership or special state enabling legislation is not feasible or available.

Two basic types of service agreements are provided:

1. Homeowner (property owner or customer) agreement with the management agency for services.

2. Management agency agreement with a local government.

Readers are encouraged to review the handbook prepared by the U.S. Department of Housing and Urban Development, *Central Water and Sewage Systems (Ownership and Organization)*, 4075.12 revised August 1976. This handbook provides sample ordinances and agreements for preparing third party agreements, trust deeds, and beneficiary contracts for management of publicly- and privately-owned wastewater systems. Brief descriptions of these legal mechanisms are also included.

PROPERTY OWNER MANAGEMENT AGENCY AGREEMENT

GRANT AND AGREEMENT

I/We hereby grant to GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT the right to maintain, operate and repair the sewage disposal facility situate upon Lot ...., Auburn Lake Trails Subdivision, Unit No. ...., El Dorado County, California as shown on that map recorded in Book .... of Maps, at Page ...., El Dorado County Records, upon its completion to the satisfaction of said District.

I/We agree to observe all of said Districts rules, regulations, and ordinances heretofore and hereinafter enacted, and pay all of said Districts charges including, but not limited to, charges incurred by the District for modifications required by said rules, regulations, and ordinances, which I/We fail to make as so required.

I/We further agree that this grant and agreement shall be binding upon all of my/our successors and assigns of said lot.

I/We further agree that this grant and agreement shall not obligate said District in itself to maintenance, operation or repair of said sewage disposal system.

DATED: .... SIGNED: ....

....

....

....

Signatures of the owners of the lot, trustees or beneficiaries under any deed of trust are required.

STATE OF CALIFORNIA
COUNTY OF .... } ss

On ...., before me, the undersigned, a notary public in and for said county and state, personally appeared ....

....

known to me to be the person whose name is/are subscribed to the within instrument and acknowledged that he/they executed the same.

WITNESS my hand and official seal.

....
NOTARY PUBLIC IN AND FOR THE COUNTY OF
...., STATE OF CALIFORNIA.

MANAGEMENT AGENCY/LOCAL GOVERNMENT AGREEMENT

SERVICE AGREEMENT BETWEEN___________________
NATURAL RESOURCES CONSERVATION DISTRICTS
AND THE TOWN OF___________________________

This agreement itemizes the responsibilities of the Town and of the Natural Resources Conservation District in carrying out the On-Site Sewage Disposal Program. This program formulated to give towns and individuals technical assistance on on-site sewage installation.

Town Responsibilities

1. The Town shall establish a Health Regulation and/or an ordinance to require inspection of each proposed on-site sewage disposal system prior to issuance of a permit. The Health Regulations must conform to the minimum recommended Health Regulations, sub chapter 10, Part II, Waste Water Treatment and Disposal - Individual On-Site Systems as adopted July 29, 1977. A town may wish to modify this proposed regulation for their own particular needs before final approval by the State Health Board and adopt this under Title 18, VSA, Sec. 613 or adopt a local bylaw which in most cases may be adopted under Chapter 9, Title 24 of Vermont Statutes Annotated. An acceptable amended copy is attached.

2. The Town shall request the services of the District Sanitary Specialist and participation in the program.

3. The Town shall receive all applications for permits and collect any fees that may be assessed. The Town will pay $50.00 per job upon receipt of initial application.

4. The Town notifies the District of services needed by individuals.

5. The local Board of Health or its duly appointed agent shall review applications and notify District, the Specialist and the individual of action taken.

6. The local Board of Health or its duly appointed agent shall review installation reports from the Specialist and notify District and individual of certification of installation or corrective measures needed.

7. The Town shall be responsible for all enforcement and legal actions.

Natural Resources Conservation District Responsibilities

1. Furnish a trained Specialist to assist individuals in towns that are participating in the On-Site Sewage Disposal Program.

2. The Sanitary Specialist will inspect and report on each individual site application submitted to the District by town officials, prior to issuance of a Town Permit.

3. The Sanitary Specialist provides planning assistance to individuals including soils and site information and engineering design criteria or specific site design based on prearranged work schedules with the Applicant or his agent.

4. The Sanitary Specialist conducts on-site checks of installation before covered with earth fill and prepares and submits written report on each installation to the local Board of Health or its duly appointed agent, the District and the Applicant.

5. The Sanitary Specialist will conduct maintenance or operational checks of existing septic systems that are exposed and accessible as workload permits.

6. The Sanitary Specialist will assist with general education workshops for contractors, health officers, municipal officials, agency representatives and individuals as workload and time permits.

Other

Neither the district nor the landowner nor the town nor the specialist will be liable for damage to the other's property or personal injury resulting from the carrying out of this agreement.

This agreement will remain in effect until terminated in writing by either party.

______________________________	______________________________
Town Officials	District Officials
______________________________	______________________________
Date	Date

LEGAL MECHANISMS TO GUARANTEE PERMANENT MANAGEMENT OF PRIVATELY-OWNED COMMUNITY WASTEWATER SYSTEMS

TRUST DEED

The trust deed is an instrument by which the owner legally conveys the system to a third party (the trustee), who, on behalf of the consumers, has the authority to take possession in the event the corporation fails to operate the system in accordance with the provisions of the trust deed regarding reasonable rates and continued satisfactory service.

The trustee should preferably be a governmental authority. An established community utility, approved mortgagee, or a title company would also be acceptable. If a trustee other than a unit of local government or an approved mortgagee is proposed, it will be necessary to determine that there is no identity-of-interest between the owners of the system and the trustee.

The trust deed also contains a provision for arbitration in the event differences of opinion arise over a need for changes in the service charges. This provision also includes an equitable method for determining the amount of a rate increase or decrease where such change is found to be justified.

THIRD PARTY BENEFICIARY CONTRACT

The basic difference between the trust deed and the third party beneficiary contract is that the former conveys legal title of the system to the trustee, whereas the latter creates a covenant running with the land giving each homeowner and the representative the right to commence suit for defaults in operation or unreasonably increased rates. The owner corporation agrees to perform satisfactory service at reasonable rates. The instrument provides that any person whom the agreement benefits may petition a court of competent jurisdiction to appoint a receiver for the purpose of operating the system in the event the owner does not provide service. The instrument also includes an arbitration clause similar to that in the trust deed for the adjustment of service rates.

FRANCHISES FROM GOVERNMENTAL AUTHORITIES

Privately-owned water and sewage systems can be operated under a franchise from a unit of government having franchising powers granted by state statutes.

The provisions of any franchise will have to assume control by the franchising authority of the quality of service as long as the use of the utility is necessary. If the initial term of the franchise is considered too short, it will have to be coupled with options to extend the term.

It is also necessary to include in the franchise a provision for controlling the service charges, and a provision for continued operation in the event service is unsatisfactory.

Note: For additional information on these topics (including sample deeds and contracts), see the HUD publication (reference No. 8) listed in the bibliography (Section III-3).

SECTION III-3

BIBLIOGRAPHY

Listed in the bibliography are several key documents that contain valuable information on institutional and management issues for small wastewater systems.

BIBLIOGRAPHY

1. *Interim Study Report, Management of On-Site and Small Community Wastewater Systems*, EPA/M687, U.S. Environmental Protection Agency, Municipal Environmental Research Laboratory, Prepared by Roy F. Weston, Inc., West Chester, Pennsylvania, November 1979.

2. *A Strategy for Small Alternative Wastewater Systems*, EPA Office of Water Program Operations, December 1980.

3. *Planning Wastewater Management Facilities for Small Communities*, EPA/600-80-030, U.S. Environmental Protection Agency, Municipal Environmental Research Laboratory, Prepared by Urban Systems Research and Engineering, Cambridge, Massachusetts, August 1980.

4. *Small Wastewater Systems: Alternative Systems for Small Communities and Rural Areas*, U.S. Environmental Protection Agency, Washington, DC, January 1980.

5. *Community-Managed Septic Systems - A Viable Alternative to Sewage Treatment Plants*, Report to the Congress by the Comptroller General of the United States, United States General Accounting Office, 3 November 1978.

6. *Design Manual -- On-Site Wastewater Treatment and Disposal Systems*, EPA 625/1-80-012, EPA Office of Water Program Operations, Municipal Environmental Research Laboratory, Office of Research and Development, October 1980.

7. *Individual On-Site Wastewater Systems*, Volumes 1 through 7, Edited by Nina J. McClelland, National Sanitation Foundation, Ann Arbor, Michigan.

8. *Central Water and Sewage Systems (Ownership and Organization*, 4075.12 Revised, U.S. Department of Housing and Urban Development, Washington, DC, August 1976.

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